

CHEM 5321 Section 001

Biochemical Foundations and Treatment of Disease Spring 2025

Instructor: Dr. Dustin Patterson

Office: Ratliff Building South, Room 3028

Phone: 903-656-5623

Email: dpatterson@uttyler.edu

Office Hours: Tuesday 9:30-10:30 am, Thursday 1:30-3:30 pm, and by appointment.

Lecture: Monday, Wednesday, and Friday 11:15 am-12:10 am in Soules College of Business (COB) 111.

Text: There is no textbook for this course. Required readings will be provided in the form of review articles, book chapter, or other sources of primary literature through the Canvas webpage for the course.

Course Resources: Canvas webpage will be used to provide required texts and other information.

Course Content:

This course takes an in depth look at the molecular basis of human diseases. The course will start by examining genetics as a starting point for understanding disease and how genetic mutations can lead to changes in the functional materials of the cell, namely proteins. Students will learn how disease is much more complex than merely genetics and learn to delve deeper by looking at epigenetics, nutrition, and the gut microbiome. Modern methods for targeting and treating disease using molecular strategies will be explored in depth. Some diseases that will be discussed include cancer, cystic fibrosis, prion diseases, Alzheimer's disease, and infection by viruses.

Course Learning Objectives:

- Build a foundational understanding of how genetics relates to human disease and how genetic mutations can arise
- Link the genetic basis of disease to the functional changes that result at the molecular level
- Learn how changes in protein sequence modify the function of the protein
- Learn how metabolic, signaling, and other cell processes are impacted by modifications to the proteins that result in disease
- Examine new frontiers in medical science such as epigenetics, gut microbiome, and new ideas that are emerging from the literature
- Evaluate treatment strategies used to combat disease and understand the rational molecular basis for these treatments
- Foster independent literature review and scientific presentation skills

Grade Distribution:

The overall grade will be determined by the student's performance on midterm exams, an individual project that includes a written report and oral presentation, any assigned homework, and a final cumulative exam. Examinations will cover all materials from text, lectures, and any assigned materials. Individual's projects will review a current topic in human disease and discuss the molecular basis for treatments used in combatting the disease topic chosen. Homework sets will reinforce principles discussed in lecture,

providing word-based problems that require students to identify and utilize principles to answer real world problems in faced in disease. The breakdown of these components to your final grade is as follows:

Homework	10%
Individual's Report and Presentation	30%
Midterm Exams (2)	40% (20% each)
Final Exam	<u>20%</u>
Total	100%

Final grades will be determined on a standard grading scale of A 90-100%, B 80-89%, C 70-79%, etc. Incentive points may be added, based on initiative, class participation, and improvement in the course.

Cheating of any kind will not be tolerated. Please make yourself aware of the university policy for academic dishonesty in the *Student Guide to Conduct and Discipline at UT Tyler*. During examinations writing utensils, a calculator (non-programmable), and ruler are the only things that will be allowed on your desk, in addition to scrap paper that will be provided. All questions concerning the exam should be directed to the instructor and any talking amongst students may be punishable by point deductions as the instructor sees fit.

Artificial Intelligence Use Policy:

For this course, artificial intelligence (AI) use on assignments is not permitted. The work submitted by students in this course will be generated by themselves. It is to the benefit of the student that any homework assigned be done by the student without any AI services. 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).

Attendance and make-up policy:

Class attendance is required. The instructor must be notified of any expected absences according to University of Texas at Tyler guidelines and may be excused for reasons allowed by the university (see statements below). Make-ups will be allowed only for reasons outlined in the University of Texas at Tyler bylaws (see below).

Census and Withdraw Dates:

The Census Date is January 27, 2025, and the Last Day to Withdraw is March 31, 2025.

Tentative Lecture Outline

- 01/13/25 Disease: What is it?
- 01/15/25 Role of Genetics in Disease
- 01/17/25 Genetic Mutation

01/20/25 Martin Luther King Jr. --Day No Class

01/22/25 Epigenetic Disease

01/23/25 Environmental/Nurture Induced Disease

01/27/25 Causes vs. Symptoms

01/29/25 The Immune System and Inflammation

01/31/25 The Immune System and Inflammation

02/03/25 Single Gene Mutation Disorder: Sickle Cell Anemia

02/05/25 Single Gene Mutation Disorder: Cystic Fibrosis

02/07/25 Gene Therapy and CRISPR (Topic for Group Project Due)

02/10/25 Endocrine Disorders (focus on diabetes)

02/12/25 Endocrine Disorders

02/14/25 Endocrine Disorders

02/17/25 Immune System Disorders (Celiac Disease)

02/19/25 Immune System Disorders

02/21/25 Exam 1 (Material covered from 01/13 thru 02/14)

02/24/25 Immune System Disorders

02/26/25 Cancer

02/28/25 Cancer

03/03/25 Cancer

03/05/25 Cancer

03/07/25 Cancer

03/10/25 Neurological Disorders

03/12/25 Neurological Disorders

03/14/25 Neurological Disorders

03/17/25, 03/19/25 and 03/21/25 No Class—Spring Break

03/24/25 Cardiovascular Diseases

03/26/25 Cardiovascular Diseases

03/28/25 Cardiovascular Diseases

03/31/25 Respiratory Diseases

04/02/25 Respiratory Diseases

04/04/25 Respiratory Diseases (Project Report Due)

04/07/25 Respiratory Diseases

04/09/25 Special Topic

04/11/25 Exam 2

04/14/25 UG Group Presentations (2 groups)

04/16/25 UG Group Presentations (2 groups)

04/18/25 UG Group Presentations (2 groups)

04/21/25 UG Group Presentations (2 groups)

04/23/25 UG Group Presentations (2 groups)

04/25/25 UG Group Presentations (2 groups)

04/28/25 Final Exam 10:15am-12:15pm

Final Exam: Monday, April 28, 2025, from 10:15am-12:15pm in regular classroom.

See [spring-2025-final-exam-schedule.pdf](#) for the link to the official schedule.

I reserve the right to make modifications as needed to the course. This will be done in accordance with university bylaws.

See links below for additional information about student resources and University policies.

[Student Resources](#)

[University Policies and Information](#)