

CHEM 4344 Section 001 Molecular Basis of Disease Spring 2025

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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 will introduce students to the molecular basis of human diseases. It builds upon the principles learned in the prerequisite introductory biochemistry course (CHEM 4334) to examine the fundamental causes of disease at the molecular level. The course will examine the genetic foundations of disease, how genetic mutations ultimately lead to specific structural and functional changes to the proteins they encode, why changes in protein structure and function lead to the health conditions observed, and modern methods that look to target the molecular basis of the disease to alleviate or cure the problem. The aim of this course is to help students gain a strong understanding of the biochemical basis of diseases, how understanding the biochemical origins can allow us to develop treatment strategies and prepare them to be able to make informed rationally based decisions about disease that will guide them in their professional and personal lives.

Course Learning Objectives:

- Build a foundational understanding of how genetics relates to human disease
- Learn where genetic mutations can arise from
- 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
- Evaluate treatment strategies used to combat disease and understand the rational molecular basis for these treatments
- Foster collaboration and literature research through an assigned group project

Grade Distribution:

The overall grade will be determined by the student's performance on midterm exams, a group 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. Group 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%
Group Report and Presentation	25%
Midterm Exams (2)	40% (20% each)
Final Exam	<u>25%</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.

Academic Honesty

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.

NOTE THE POLICY FOR SMART DEVICES BELOW.

Cell phones and smart watches/electronic devices must be put away during exams. If they are observed out in a visually accessible place (i.e. between legs, on the floor, etc.), it will be assumed that they are being used to cheat and your exam will be taken, you will receive a zero score (0 points) for the exam, and you will be referred to the Office of Judicial Affairs.

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 (Group Project Report Due)

04/07/25 Respiratory Diseases

04/09/25 Special Topic

04/11/25 Exam 2

04/14/25 Group Presentations (2 groups)

04/16/25 Group Presentations (2 groups)

04/18/25 Group Presentations (2 groups)

04/21/25 Group Presentations (2 groups)

04/23/25 Group Presentations (2 groups)

04/25/25 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](#)