UNT | COLLEGE OF SCIENCE
Department of
Biological Sciences

COURSE SYLLABUS (Spring 2026)

Course Title	BIOC/BIOL 4570 | BIOC/BIOL 5340 Biochemistry & Molecular Biology of the Gene
Meeting Times	Tues, Thurs 9:30-10:50 AM
Location	Wooten Hall 222 (Wh 222)
Instructor	Dr. Ikjot Singh Sohal Assistant Professor of Cancer Biology
Contact Information	ikjot.sohal@unt.edu
Office Hours	Tues and Thurs 4-5 PM (or by appointment)
Office Location	Science Research Building (SRB), Room 238

Recommended Textbook (not required):

Lewin's Genes XII by Krebs, Goldstein and Kilpatrick; 12th Edition, 2018*

*Prior recent editions of the textbook (X or XI) are also acceptable.

Course prerequisites, Corequisites, and/or Other restrictions:

At least one of the following: BIOL 3510/3520, BIOL 3451/3452, or BIOC 4540.

Minimum Technology Requirements:

An **iClicker app-compatible device** will be required for attendance and answering questions. If you haven't, please sign up for an iClicker student account via the link provided **here**. If you don't have a compatible device or have technical challenges, please contact Dr. Sohal at the beginning of the semester.

Course description

Gene regulation is the core logic of life. Gene regulation is the reason why neurons and skin cells behave completely differently, even though they have the same DNA. Gene regulation, or dysregulation, are the fundamental reasons for diseases, such as cancer and neurological diseases. This is the reason why all modern therapeutics (cancer therapeutics, COVID vaccine, diabetes drugs) target or exploit gene regulation.

This course explores how cells read, regulate, and protect their genetic information to make decisions, respond to their environment, and maintain life. Students will learn about DNA replication, transcription, translation, chromatin dynamics, RNA processing, and DNA repair, and learn how these processes integrate into regulatory networks that control gene expression. By connecting biochemical mechanisms to human health, biotechnology, and disease, the course highlights why understanding gene regulation is essential for modern biology, medicine, and research.

Student learning goals

By the end of this course, students will be able to:

- Develop a fundamental understanding of gene regulation and how cells control identity and function.
- Demonstrate an understanding of DNA replication and recombination.
- Explain the mechanisms underlying transcription regulation in prokaryotes and eukaryotes.
- Demonstrate an understanding of RNA synthesis, processing and functions.
- Understand how defects in gene regulation contribute to diseases such as cancer.
- Understand gene editing and how modern therapeutics use it to manipulate gene regulation.

Attendance

In-person attendance is expected for all class meetings. Attendance will be taken based on log-in information into iClicker. Please sign up for an **iClicker account** (see Minimum Technology Requirements on page 1). Class will start promptly at 9:30 am and end at 10:50 am. Credit points for good attendance may be given at the end of the semester. Absences due to illness will be excused if a health provider's note or similar documentation is provided.

Please remember to mark yourself present on the iClicker app as you come into the classroom.

Class recordings

Lectures will not be recorded. If you would like to record audio of the lecture to later help you study the material, please contact me to obtain permission. No video recordings are permitted.

Student participation (10% of your overall grade)

You are encouraged to participate and promote classroom discussion through

- Answering questions using iClicker
- Asking questions and/or follow-up questions
- Sharing anecdotal experiences relevant to the scientific concept(s) being discussed in the classroom (for e.g. experiences related to gene therapy or COVID vaccine)
- Attending graduate student presentations (see below)

Your participation in the class will mainly be assessed through iClicker participation. Other forms of participation may be considered toward participation when iClicker participation is lacking or when the final grade is borderline to the next higher grade.

Exams (60% of your overall grade)

There will be 4 exams (3 mid-term exams and a final exam).

Undergraduate students	Graduate students
For undergraduate students, only your 3 highest exam grades will count, i.e., you will drop your lowest exam grade.	For graduate students, all exams are compulsory and the final exam will be in the form of an oral presentation. You will work with me to select a highly-acclaimed published research paper on gene regulation. The organism or the disease model studied in the published paper should be related to your own master's or doctoral research focus. **Undergraduate students are highly encouraged to attend graduate student presentations, as they may be considered toward "student participation" grade**. The oral presentation will be for a total of 25 min (20 min presentation + 5 min for Q&A). The presentation is recommended to include the following aspects: • Introduction – describe your research and motivation for selecting the paper. • Introduce the main authors of the study – first author/co-authors and corresponding author(s). • Include necessary background information from other sources and appropriately cite those sources in your presentation. • Clearly describe the why or the motivation behind the study. • Clearly describe the how, or the approach, of the study. • Clearly describe the findings of the study. • Conclusions and limitations of the study, if any. The overall presentation will be evaluated by me and the undergraduate students based on the above-mentioned points. Please contact me early in the semester for selecting the research paper, and with any questions related to the presentation. **The research paper to present must be finalized by Feb 28th**.

These points apply to all students:

- **There will be no make-up exams**, except in cases of emergencies, which will be considered on a case-by-case basis.
- Any student found cheating on any exam will receive a grade of zero (0) for that exam and may face other disciplinary action(s).
- **The exam dates are fixed and will not change**. The content included on each exam may be different than what is listed in the tentative course schedule. If there are changes to the topics covered on an exam, it will be announced in class and on Canvas. Students will not be tested on concepts that have not been covered in the class.
- **All exams, including the final exam, are non-comprehensive**, i.e., only topics covered since the previous exam will be covered in the next exam.

Homework assignments (30% of your overall grade)

During the course, you will be provided with homework assignments. The deadline for submission of these assignments will be announced at the appropriate time. Late submissions will not be accepted.

Grading

Your final course grade will include your **3 highest exam scores (60%), in-class participation (10%),** and **homework scores (30%)**. Grading will follow a standard scale:

100 – 90%	A
89 – 80%	B
79 – 70%	C
69 – 60%	D
59% & below	F

Students with disabilities

UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one's specific course needs. Students may request accommodations at any time; however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information, please see the ODA website at disability.unt.edu. If you believe you have a disability requiring accommodation, please contact Dr. Antunes and/or contact the Office of Disability Accommodation at 940-565-4323 during the first week of class.

Academic integrity

According to UNT Policy 06.003, Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University. The Department of Biological Sciences adheres to and enforces UNT's policy on academic integrity. Absolutely no form of copying, plagiarism, or any other type of academic dishonesty will be tolerated. Students who turn in plagiarized work or who are caught cheating will receive a grade of zero for that assignment or exam and may even be withdrawn from the course.

Emergency notification and procedures

UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

Acceptable student behavior

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student's conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, etc. The Code of Student Conduct can be found at deanofstudents.unt.edu/conduct.

Access to information – Eagle Connect

Students' access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student's Eagle Connect account. For more information, please visit the website that explains Eagle Connect and how to forward e-mail: aits.unt.edu/eagleconnect/

Course Evaluation

Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course. The dates when the evaluation will be open for you to complete will be announced during the semester.

Student Expectations

As a first-generation college graduate, I know firsthand that creating a successful career requires hard work, passion, perseverance, the ability to adapt, and implement learning as a lifelong process. This is especially true in the world of AI, when your authenticity and your unique abilities will likely become the main distinguishing factors. Below, I have summarized some of the ways you can gain most out of this course (or any course) and hopefully, create a learning process that makes you competitive for your choice of career.

- **Attend the lectures!** Use the learning opportunities that lecture provides. You don't only learn about course content in lecture, you also learn to get disciplined about a schedule, how to take notes, how to sort through the material covered, and how to apply what you read about to novel situations.
- **Participate in class!** By communicating your ideas, you organize your thoughts. I want to hear what you have to say! Ask questions, during or after class.
- **Take good notes!** Be selective about what you write down. You don't have to copy slides word for word – I post the lecture slides on Canvas before class. Not all of the points made in class will be written out on the lecture slides, so it is important for you to come to class and take notes on what I say. *Listen*, and write only the main points. Get notes from a classmate if you miss class.
- **Be curious!** The textbook contains much more detailed information about the topics than we can reasonably cover in class. Remember, the courses you take at UNT prepare you for your future career, so don't just think about studying for the exams. Embrace the knowledge!
- **Study!** The rule of thumb is that you spend 2 hours of study time for each hour spent in class, but you may need more or less time – only you can determine that. Some topics will require more time, others less. You should get into the habit of studying weekly, not just right before exams. We cover a lot of

material and it will get overwhelming quickly if you do not keep up. Studying for exams will be a lot easier if you have reviewed on a weekly basis. Your grade will show it!

- **Draw and write as you study!** Test yourself. Writing and drawing things out is a great way to make sure you really understand the concepts. Often times, simply reading the material is not sufficient to assimilate the information.
- **Study in groups!** Discussing material with others always helps reinforce concepts. It forces you to organize thoughts and think about important points. Talking with peers about the material also helps you clarify misconceptions. Also, teaching others is a great way to improve your own understanding of the material!
- **Get help if you need it!** Ask questions. I want to know if I need to clarify concepts. Stop me in lecture or come to my office hours and ask if things don't make sense. Seek help early on, before the amount of material gets out of hand. Also, utilize the resources available to students at the UNT Learning Center.

In full transparency, some of these points are from my own experiences and some are adapted from others'.

COURSE LECTURE SCHEDULE – SPRING 2026

DATE	DAY	CHAPTER(S)	MAIN THEME	SPECIFC TOPIC(S)
JAN 13	TUES	–	***The organization*** *of genes and chromosomes*	Introduction & Syllabus
JAN 15	THURS	1		Genes
JAN 20	TUES	3 & 4		Gene Structure; Genome
JAN 22	THURS	5		Genome Sequences and Evolution
JAN 27	TUES	6		Clusters and Repeats of Genes
JAN 29	THURS	7 & 8		Chromosomes & Chromatin
FEB 03	TUES	–		*The Human Genome Project*
FEB 05	THURS			**EXAM 1 (Chapters 1, and 3-8)**
FEB 10	TUES	9 & 10	***DNA replication*** *without errors, and the consequences of not fixing the errors*	Replication Initiation
FEB 12	THURS	11		The process of DNA Replication
FEB 17	TUES	12		Extrachromosomal Replicons
FEB 19	THURS	13		Recombination (Errors during DNA Replication)
FEB 24	TUES	14		Repair Systems
FEB 26	THURS	16		Somatic DNA Recombination
MAR 03	TUES	–		*The Cancer Genome Atlas*
MAR 05	THURS			**EXAM 2 (Chapters 2, and 9 to 14)**
MAR 10	TUES	–		SPRING BREAK – NO CLASS
MAR 12	THURS	–		SPRING BREAK – NO CLASS
MAR 17	TUES	17 & 18	***Transcription*** *(DNA-to-RNA)* & ***Translation*** *(RNA-to-protein)*	Prokaryotic and Eukaryotic Transcription
MAR 19	THURS	19 & 20		RNA Processing, Stabilization and Localization
MAR 24	TUES	21 & 22		Other functional RNAs & Translation
MAR 26	THURS	23		The Genetic Code
MAR 31	TUES	2		Molecular Biology Tools
APR 02	THURS			**EXAM 3 (Chapters 17 to 23)**
APR 07	TUES	24 & 25	***Gene regulation at multiple levels*** *(replication, transcription, translation, and post-translation)*	Prokaryotic gene regulation
APR 09	THURS	26		Eukaryotic gene regulation
APR 14	TUES	27 & 28		Epigenetic gene regulation
APR 16	THURS	29		Non-coding RNAs can regulate gene expression
APR 21	TUES	30		Small RNAs can regulate gene expression
APR 23	THURS	–		*Gene regulation technologies and their limitations*
APR 28	TUES			**GRADUATE STUDENT PRESENTATIONS** (*undergraduate students encouraged to attend*)
APR 30	THURS			**GRADUATE STUDENT PRESENTATIONS** (continued) & Review session for final exam
MAY 05	TUES			
MAY 07	THURS			**FINAL EXAM**

*The schedule is tentative and subject to change. Topics per day may vary, but exam dates are set and will not change.