

BIOC 4570/ BIOL 4570

Biochemistry & Molecular Biology of the Gene

Fall 2025 • Mon, Wed, Fri 8:00 – 8:50 am • CHIL 245 (in person only)

Professor: Dr. Mauricio S. Antunes (he/his)

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 Office: Science Research Building (SRB), Room 126
 Office Phone: (940) 369-5457
 Office Hours: Mondays, 4 – 5 pm and Wednesdays, 11 am – 12 pm (or by appointment)

Course Description and Objectives:

Content of the genome. Mechanisms and regulation of gene expression, chromosome replication, mutagenesis and DNA repair, and gene cloning in prokaryotic and eukaryotic systems. Principles of commonly used molecular biology methods. May not be used to satisfy minor requirements in chemistry.

Course Pre-requisites, Co-requisites, and/or Other Restrictions:

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

Student Learning Goals:

1. Demonstrate an understanding of gene, chromatin, and chromosome structure and organization.
2. Demonstrate an understanding of DNA replication and recombination.
3. Explain processes involved in prokaryotic and eukaryotic transcription.
4. Demonstrate an understanding of RNA synthesis, processing and functions.
5. Explain the mechanisms underlying transcription regulation in prokaryotes and eukaryotes.
6. Demonstrate an understanding of gene editing and its applications.
7. Demonstrate an understanding of basic molecular biology methods.

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.*

Attendance:

Attendance in person is expected for all class meetings. Class will start promptly at 8:00 am and end at 8:50 am. Attendance will be taken based on log-in information into iClicker. Please remember to mark yourself present on the iClicker app as you come into the classroom. Sign up for an iClicker account via the link provided on the course's page on Canvas. 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.

Minimum technology requirements:

All lectures and exams will be conducted in person. Because class attendance will be taken using the *iClicker* app (see above), a mobile phone, laptop or tablet-style computer that is compatible with the *iClicker* app will be required to register your attendance. If you have any difficulties obtaining a compatible device, please contact Dr. Antunes at the beginning of the semester for alternative arrangements.

Class Recordings:

I will not record lectures this semester. If you would like to record audio of the lecture to later help you study the material, please contact me to obtain permission.

Student Participation – In-class iClicker Questions

Throughout the semester, I will ask questions in class occasionally for you to answer using iClicker. **Your participation in class answering these questions will count toward 10% of your overall course grade.**

Exams:

There will be **4 exams** for this course (3 mid-term exams and a final exam). Exams will count toward **60% of your overall course grade**. Only your 3 highest exam grades will count, i.e., you will drop your lowest exam grade.

- **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**; however, 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 class. The Final Exam is not comprehensive.

Homework Assignments:

There will be homework assignments to complete during the semester. These assignments will be worth **30% of your overall course grade**. 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 the **3 highest exam scores (60%), your in-class iClicker 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 & 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: eagleconnect.unt.edu/

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:

- **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 are preparing 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 material. Often times, simply reading the material is not sufficient to assimilate the information.
- **Study in groups!** Discussing the 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: learningcenter.unt.edu/home

COURSE LECTURE SCHEDULE* – FALL 2025

	DATE	CHAPTER(S)	TOPIC(S)
M	AUG 18	--	Syllabus/Introduction
W	AUG 20	1	Genes are DNA and Encode RNAs and Polypeptides
F	AUG 22	1	Genes are DNA and Encode RNAs and Polypeptides
M	AUG 25	2	Methods in Molecular Biology and Genetic Engineering
W	AUG 27	2	Methods in Molecular Biology and Genetic Engineering
F	AUG 29	2	Cloning
M	SEP 01		LABOR DAY – NO CLASS
W	SEP 03	3	The Interrupted Gene
F	SEP 05	4	The Content of the Genome
M	SEP 08	5	Genome Sequences and Evolution
W	SEP 10	5	Genome Sequences and Evolution
F	SEP 12	6	Clusters and Repeats
M	SEP 15	7	Chromosomes
W	SEP 17		EXAM 1 (Chapters 1-6)
F	SEP 19	7	Chromosomes
M	SEP 22	8	Chromatin
W	SEP 24	9	Replication is Connected to the Cell Cycle
F	SEP 26	10	The Replicon: Initiation of Replication
M	SEP 29	11	DNA Replication
W	OCT 01	11	DNA Replication
F	OCT 03	12	Extrachromosomal Replicons
M	OCT 06	12	Extrachromosomal Replicons
W	OCT 08	13	Homologous and Site-Specific Recombination
F	OCT 10		EXAM 2 (Chapters 7-12)
M	OCT 13	13	Homologous and Site-Specific Recombination
W	OCT 15	14	Repair Systems
F	OCT 17	14	Repair Systems
M	OCT 20	--	CRISPR – Gene Editing
W	OCT 22	--	CRISPR – Gene Editing
F	OCT 24	17	Prokaryotic Transcription
M	OCT 27	17	Prokaryotic Transcription
W	OCT 29	18	Eukaryotic Transcription
F	OCT 31	19	RNA Splicing and Processing
M	NOV 03	20	mRNA Stability and Localization
W	NOV 05		EXAM 3 (Chapters 13-19)
F	NOV 07	22	Translation
M	NOV 10	22, 23	Translation, Using the Genetic Code
W	NOV 12	24	The Operon
F	NOV 14	26	Eukaryotic Transcription Regulation
M	NOV 17	26	Eukaryotic Transcription Regulation
W	NOV 19	21, 29	Catalytic and Noncoding RNA
F	NOV 21	30	Regulatory RNA
M	NOV 24		FALL BREAK – NO CLASS
W	NOV 26		FALL BREAK – NO CLASS
F	NOV 28		FALL BREAK – NO CLASS
M	DEC 01	--	Introduction to Synthetic Biology
W	DEC 03		Review Session for Final Exam
F	DEC 05		Reading Day – NO CLASS
M	DEC 08		FINAL EXAM (8:00 – 10:00 am) – (Chapters 20-30)

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