



Faculty of Engineering and Natural Sciences
Introduction to Molecular Biology
BIO301

Spring 2023

Instructor: Nur Mustafaoglu

Email: nur.mustafaoglu@sabanciuniv.edu

Website: <http://mustafaoglu.com/>

TAs:

- Gulin Baran, Email: gulinbaran@sabanciuniv.edu
- Eda Kuş, Email: eda.kus@sabanciuniv.edu
- Zeynep Doğan, Email: zeynepdogan@sabanciuniv.edu

Course Address:

8:40 am - 9:30 am	Monday	FENS L047
12:40 am – 14:30 pm	Tuesday	FENS L030
16:40 am – 19:30 pm	Thursday	FENS 2053 (no Lab until April)

Zoom: <https://sabanciuniv.zoom.us/j/96524300417?pwd=NE96a0JXbzIqY3VuQ1FGbkJzWE4vQT09>

Meeting ID: 965 2430 0417

Passcode: 249810

We may have to revise the course plan according to the countrywide reassessment to be made regarding higher education. This is expected to happen at the beginning of April. The content to be delivered is certain but the method of course delivery, the number and dates of exams, and some other details are subject to change

Office Hours: by appointment!

Please make sure to schedule an appointment with the instructor and/or TAs prior the meeting.

Objectives:

This course is designed as two parts: i) lectures having the objectives of understanding concepts in molecular biology and gene regulation, ii) experimental lab sessions having the objectives of experiencing molecular cloning techniques to produce a particular gene product.

This lecture provides introductory information about the flow of information in living things at the molecular level. Starting from genomic information, structure of DNA, RNA, and protein, packaging to chromosomes, topics such as following will be discussed in the lecture 1) DNA replication, repair and recombination, 2) RNA transcription and modification, and 3) protein translation, folding and modification.

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

- Demonstrate an understanding on DNA, RNA, and protein structures and their relationships
- Discuss the structure and function of proteins including the roles of individual amino acids in protein folding charge, acid/base properties, and protein-protein interactions.
- Discuss chromatin structure and how it can be modified to affect gene expression.
- Explain the mechanisms of DNA replication and repair, RNA synthesis and processing, and protein synthesis.
- Describe how gene expression is regulated at the transcriptional and post-transcriptional level.
- Demonstrate the ability to effectively communicate and work collaboratively with peers in the small group setting to successfully address problems sets in molecular cell biology and genetics.

Course Materials:

Main Book:

- Molecular Biology of the Gene, Seventh Edition, Pearson
J. D. Watson, T. A. Baker, S. P. Bell, A. Gann, M. Levine, R. Losick
ISBN-13: 9780321762436

Additional Sources:

- Molecular Biology Principles of Genome Function
N. Craig, R. Green, C. Greider, G. Storz, C. Wolberger, O. Cohen-Fix
ISBN-13: 978-0199658572
- Molecular Biology of the Cell
B. Alberts, A. D. Johnson, J. Lewis, D. Morgan, M. Raff, K. Roberts, P. Walter
ISBN-13: 978-0815344322
- Review articles
- Research articles

Weekly Plan (dates are tentative)

Week 1	27/02/2023	Course Introduction	
	28/02/2023	Nucleic Acids Convey Genetic Information	<u>Reading:</u> Chapter 2
Week 2	06/03/2023	The Structure of DNA	<u>Reading:</u> Chapter 4
	07/03/2023		
Week 3	13/03/2023	The Structure and Versatility of RNA	<u>Reading:</u> Chapter 5
	14/03/2023		
Week 4	20/03/2023	The Structure of Proteins	<u>Reading:</u> Chapter 6
	21/03/2023		
Week 5	27/03/2023	Genome Structure, Chromatin, and the Nucleosome	<u>Reading:</u> Chapter 7
	28/03/2023		
Week 6	03/04/2023	The Replication of DNA	<u>Reading:</u> Chapter 8
	04/04/2023	Midterm 1: Weeks 1-5	
Week 7	10/04/2023	The Replication of DNA	<u>Reading:</u> Chapter 8
	11/04/2023		
Week 8	17/04/2023	The Mutability and Repair of DNA	<u>Reading:</u> Chapter 10
	18/04/2023		
Week 9	24/04/2023	Homologous Recombination at the Molecular Level	<u>Reading:</u> Chapter 11
	25/04/2023		
Week 10	01/05/2023	Site Specific Recombination and Transposition of DNA	<u>Reading:</u> Chapter 12
	02/05/2023		
Week 11	08/05/2023	Mechanisms of Transcription	<u>Reading:</u> Chapter 13
	09/05/2023		
Week 12	15/05/2023	Exon Shuffling	<u>Reading:</u> Chapter 14
	16/05/2023	Midterm 2: Weeks 7-11	
Week 13	22/05/2023	RNA Splicing	<u>Reading:</u> Chapter 15
	23/05/2023	<i>Translation</i>	
Week 14	29/05/2023	Translation	<u>Reading:</u> Chapter 16
	30/05/2023	The Genetic Code	

Labs: Additional syllabus will be provided for the lab sections separatelyReading: Chapter 7: Techniques of Molecular Biology

Grading Policy:

Homework (15%): There will be 3 homework assignments throughout semester

- Homework due dates will be announced for each homework.
- Late assignments: later than the due date will not be accepted; students' grade will be 0 for that assignment.

Midterms (2x15%): There will be two midterms:

Midterm 1: Students will be responsible for the material of week 1-5

Midterm 2: Students will be responsible for the material of week 7-10

Final (25%): Students will be responsible for the whole material of the course. Question will include: Week 1-9: 25%, Week 10-13: 75%

In class performance (5%):

- There will be short questions during the lecture
- Timing of the questions can be different in each lecture
- At the end of the course, in class scores for each student individually will be ranked from highest to lowest, and only the highest half of the scores will be counted for the final score.
- Students' participant to the courses are important

Lab Quizzes (5%):

- There will be short questions after each lab section
- Student will be able to turn in the quiz answers within 24 h,
- Due date of the quizzes: Friday 20:00 pm

Lab Reports (20%):

- Students will be expected to write lab reports; more instructions will be provided during the lab sessions
- Late submissions: 10% late penalty will be implemented for up to 6 days. Lab reports submitted 6 days later than the due date will not be accepted; students' grade will be 0 for that assignment.

- Tentative grade levels:

Highest	Lowest	Letter
100.00 %	93.00 %	A
92.99 %	87.00 %	A-
86.99 %	83.00 %	B+
82.99 %	77.00 %	B
76.99 %	73.00 %	B-
72.99 %	67.00 %	C+
66.99 %	63.00 %	C
62.99 %	57.00 %	C-
56.99 %	53.00 %	D+
52.99 %	50.00 %	D
49.99 %	0.00 %	F

Exam Policy:

- Exams may include multiple choice, fill-in-the-blank, problem solving, or short answers.
- All exams will be closed book and held in class.
- For exams you will only require a pencil and a calculator.
- Phones are not allowed and must be turned off.
- If you leave during an exam, you will not be allowed back in
- Late arriving students will not be allowed after the first student finishes the exam and leaves.

Grade disputes

- Students will have one week after the return of an exam or an assignment to challenge a grade for any question with a written note providing an explanation.
- Failure to challenge the grade within this period indicates a willingness to accept the grade as is.
- The challenge should consist of a written description of why the answer is correct based on other published material that you cite.

Academic Honesty:

- All students must follow the university guidelines of academic integrity.
<https://www.sabanciuniv.edu/en/academic-integrity-statement>
- A strict zero-tolerance policy for cheating will be enforced.