

MOLECULAR GENETICS

New Mexico State University

Syllabus – Fall 2023. August 16, 2023 – December 08, 2023

Instructor: Jose L. Ortega-Carranza

Office Location:

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Office Hours:

Monday, Wednesday 10:30 am - 11:30 am. Skeen Hall W329

Student's email communications are expected to be responded within 24 hours

Course: GENE 315 M02 - Molecular Genetics

Credit Hours: 3.0

Delivery method: Face to face

Class Meeting Days and Times:

Tuesday and Thursday 9:00 am - 10:15 am

Class Meeting Location:

Skeen Hall W139

Required Text

Robert J. Brooker. Genetics: Analysis & Principles, 7th edition. McGraw-Hill Education, 2021, ISBN 978-1-260-47306-3 (ebook), ISBN 978-1-260-47302-5 (loose-leaf edition), ISBN 978-1-24085-6 (bound edition).

Course Overview

The course is designed to provide a detailed coverage of the central concepts of genetics at the molecular level. Topics to be covered include DNA structure and function, DNA replication and

repair, Transcription, Translation, gene regulation, DNA recombination, Genomics and Biotechnology

Course Organization

The course will include lectures and discussions of topics covered in the course textbook. The course is organized in four different modules:

Module 1: Overview of Genetics, Molecular Structure of DNA, RNA and Chromosomes, and DNA Replication

Module 2: The second part of the course will introduce to the Molecular Properties of Genes, including the mechanisms of Transcription, Translation and Gene Regulation in Bacteria and Eukaryotes

Module 3: The third part of the course includes Gene Regulation by Epigenetic mechanisms and Non-coding RNAs

Module 4: The last part of the course includes the Genetic Technologies utilized for the study of gene expression and the manipulation of genes

Course Learning Objectives

The overall objective of course is to provide the students with a comprehensive, accurate and up-to-date content of Molecular Genetics, to prepare them to become successful in that field.

General Education course learning objectives: Area III - Science

All general education courses are required to include instruction and evaluation of a variety of essential skills. There are three such skills associated with this course:

- Critical Thinking
- Personal and Social Responsibility
- Quantitative Reasoning

Course Schedule Fall 2023

Tuesday

8/22 Molecular Structure of DNA and RNA, Ch 9

Thursday

8/17 Overview of Genetics, Ch 1

8/24 Molecular Structure of Chromosomes and Transposable Elements, Ch 10. **Quiz #1**

8/29 Molecular Structure of Chromosomes and Transposable Elements, Ch 10	8/31 DNA replication, Ch 11. Quiz #2
9/5 DNA replication, Ch 11	9/7 Exam #1
9/12 Gene Transcription and RNA Modification, Ch 12	9/14 Gene Transcription and RNA Modification, Ch 12. Quiz #3
9/19 Translation of mRNA, Ch 13	9/21 Translation of mRNA, Ch 13. Quiz #4
9/26 Gene Regulation in Bacteria, Ch 14	9/28 Gene Regulation in Bacteria, Ch 14. Quiz #5
10/3 Gene Regulation in Eukaryotes I: Transcriptional and Translational Regulation, Ch 15	10/5 Gene Regulation in Eukaryotes I: Transcriptional and Translational Regulation, Ch 15. Quiz #6
10/10 Exam #2	10/12 Gene Regulation in Eukaryotes II: Epigenetics, Ch 16
10/17 Gene Regulation in Eukaryotes II: Epigenetics, Ch 16	10/19 Non-coding RNAs, Ch 17. Quiz #7
10/24 Non-coding RNAs, Ch 17	10/26 Gene Mutation, DNA Repair and Recombination, Ch 19. Quiz #8
10/31 Gene Mutation, DNA Repair and Recombination, Ch 19	11/2 Exam #3
11/7 Molecular Technologies, Ch 20	11/9 Molecular Technologies, Ch 20. Quiz #9
11/14 Biotechnology, Ch 21	11/16 Biotechnology, Ch 21. Quiz #10
11/21 - 11/23 Thanksgiving holiday	
11/28 Genomics: Analysis of DNA, Ch 22	11/30 Genomics: Analysis of DNA, Ch 22. Quiz #11
12/4 - 12/8 Final Exams Week	

Assignments and Exams

Assignments: All students are expected to read the assigned textbook chapters before class and be prepared to participate in class and to use class time to clarify any concepts. If you fall behind in your studies, you will find it very difficult to catch up.

You are strongly encouraged to utilize the problem sets and insights resources (i.e. Solved Problems, Conceptual Questions and Experimental Questions) provided at the end of each

chapter. These resources will strengthen your understanding of the course material, and consequently, benefit your performance on the exams.

Exams: There are four in-class Exams, covering the material presented in each of the four sections of the course. There is not a comprehensive exam. The fourth exam is held during exams week and only covers the material of module 4 of the course: Genetic Technologies.

Quizzes: Eleven in-class Quizzes, based on the reading assignments, will be given to determine the Student's learning progress. Only ten quizzes will count for 100 points of the final grade

Make-up Quizzes/Exams

There will be four exams during the semester. Missed exams may be taken within one week from the exam date, provided a valid excuse is presented. You must notify the instructor by email before the exam is missed, and subsequently present a valid justification (e.g. illness requiring doctors care or school-related activity). **Missing an exam without explanation will result in a 0 score for that exam.**

There will be eleven quizzes during the semester. The quiz with the lowest grade or a missing grade will not be included. **There will be no make up quizzes without a valid justification.**

Grades

Grading will consist of:

Exams: Four exams, worth 100 points each, for 400 points of the final grade

Quizzes: 10 points each quiz, for 100 points of the final grade

Total: 500 points

Letter grades are assigned as follows: **A** >90%; **B** 80-89%; **C** 70-79%; **D** 60-69%; **F** < 60%

Note: Grades in this course are assigned without Fractional Grading

Syllabus Modifications Statement:

This Syllabus is subject to revision to best fit the educational needs of the class. Any changes or modifications will be announced in class.