



Loyola University Chicago: BIOL 282-Genetics

John Felice Rome Center

Spring 2023

Tuesday and Thursday | 5:15-6:30pm

Dr. Eugenio Sangiorgi

Email: esangiorgi@luc.edu

Office Hours: Tue. 4:15-5:15pm

Course Description

Upon completion of this course the students will be able to understand the bases of the molecular processes governing DNA replication, transcription and translation as well as the genetic code; the Mendelian laws of inheritance that govern passage of genetic traits; the basic structure and function of DNA and chromosomes as well as how chromosomes move through mitosis and meiosis; the Hardy-Weinberg law describing the genetics equilibrium in a population. We will also explore the fundamentals aspects of genetics of cancer in humans as well as most recent techniques to sequence the whole DNA in a single individual

Learning Outcomes

Genetics is an ultrafast pace branch of science at the crossroad of several disciplines such as medicine, biology, basic science, agriculture, veterinary; and its legal and ethical implications reach virtually every aspect of everyone's life. The goal of this course is to offer solid foundation in genetic fundamentals through an examination of the basic principles of genetics in humans with a specific attention to describe the main genetic mechanisms governing transmission of diseases in humans.

For this reason, I expect the students will develop the basic skills to understand the laws of inheritance, they will be able to draw a pedigree and infer the most probable inheritance pattern, and evaluate the recurrence risk of a specific genetic condition. The students will be able to solve problems and quizzes related to these topics.

Learning how transcription, translation and the genetic code transfer the flow of genetic information from DNA to proteins and how the regulation of gene expression works.

The students will be able to describe the origins and genetic consequences of mutations and chromosomal abnormalities, allele and genotype frequencies within populations, analyze basic processes in population genetics, mutation, migration, natural selection, sexual selection and genetic drift and describe how they affect the genetic diversity within the human species.

Evaluate the consequences of somatic and germline mutations at the origin of cancer and identify the best methods for detecting and analyzing variation at gene, genome and phenotypic levels within and between individuals, using modern DNA techniques analyses.

Required Text / Materials

Genetics and Genomics in Medicine, Strachan Goodship and Chinnery – 1st Edition

Assigned readings and power point slides of each lecture will be posted on Sakai a few days before each class.

Attendance Policy

In accordance with the JFRC mission to promote a higher level of academic rigor, all courses adhere to the following absence policy. Prompt attendance, preparation and active participation in course discussions are expected from every student.

- For all classes meeting once a week, students cannot incur more than one unexcused absence.
- For all classes meeting twice a week, students cannot incur more than two unexcused absences.
- For all classes meeting three times a week, students cannot incur more than two unexcused absences.

This course meets once a week, thus a total of 1 unexcused absence will be permitted. **Unexcused absences beyond these will result in 1% lowering of the final course grade, for every absence after the “approved limit”.**

The collective health of the JFRC is everyone’s responsibility. DO NOT ATTEND CLASS IF YOU ARE ILL.

Assessment Components

- Midterm Exam 50%
- Final Exam 50%

Grading There will be one non-cumulative exam (midterm) and a second one during final exam week. The exams will consist of multiple choice-type questions, problems and short open questions. My expectation are that the following grade cut-off will apply

Grade	Cut off		
A	94-100%	4.00	Excellent
A-	90-93%	3.67	
B+	87-89%	3.33	
B	84-86%	3.00	Good
B-	80-83%	2.67	
C+	77-79%	2.33	
C	74-76%	2.00	
C-	70-73%	1.67	
No passing grades			
D+	67-69%	1.33	
D	60-66%	1.00	Poor
F	0-59%	0.00	Failure

Academic Honesty

Plagiarism and other forms of academic dishonesty are unacceptable at the JFRC and will be dealt with in accordance with Loyola University Chicago’s guidelines. Please familiarize yourself with Loyola’s standards here: http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml. You are responsible to comply with the LUC Student Handbook.

Accessibility Accommodations

Students registered with the Student Accessibility Center requiring academic accommodations should contact the Office of the Dean at the John Felice Rome Center, the first week of classes.

Course Schedule

	DATE	LECTURE	Book chapter*
Week 1	January 17 & 19	Welcome and introduction to Genetics	1
		DNA structure and DNA replication	1
Week 2	January 24 & 26	Chromatin and Genome structure	2
		General concepts about Mendelian inheritance	5
Week 3	January 31 February 2	Mendelians laws, autosomal transmission	5
		X-linked transmission pedigree analysis	5
Week 4	February 7 & 9	Exercises on pedigrees with autosomal\X-linked transmission Recurrence risk evaluation of autosomal recessive\X-linked conditions	
Week 5	February 14 & 16	Linkage analysis introduction	8
		Recombination frequency, genetic mapping	8
Week 6	February 21 & 23	LOD Score calculation and examples	8
		Study session with exam simulation exercises	
Week 7	February 28 March 2	Study session	
		Midterm exam	
Week 8	March 14 & 16	Chromosomal structural abnormalities	1,7
		Chromosomal numerical abnormalities	1,7
Week 9	March 21 & 23	Techniques of chromosomal analysis	11
		Transcription	2
Week 10	March 28 & 30	Splicing mechanism	2
		Translation	2
Week 11	April 4 & 6	Classes of mutations	4,7
		Cancer genetics	10
Week 12	April 11 & 13	Hardy-Weinberg equilibrium	5
			5
Week 13	April 18 & 20	Factors modifying the Hardy-Weinberg equilibrium	5
		Study session with exam simulation exercises	
Week 14	April 24 - 27	Final exam	

*Book chapter refers to *Genetics and Genomics in Medicine*, Strachan Goodship and Chinnery – 1st Edition