COURSE INFORMATION

Course Title	Code	Semester	L+P Hour	Credits	ECTS
GENETİCS	AQS108	4. Semester	2 + 0	2.0	2.0

Prerequisites	None

Language of Instruction	English
Course Level	Bachelor's Degree
Course Type	Compulsory
Office Day-Hours	
Course Coordinator	İsmail AKYOL
Instructors	İsmail AKYOL Mehmet Ali YILDIZ Mustafa Muhip ÖZKAN
Assistants	**-**
Goals	The course aims to overview of the principles of plant and animal genetics including Mendelian and modern concepts of heredity. Provide extensive professional point of view to the central dogma of molecular biology. Developments in molecular genetics will be addressed through the biochemistry of the gene and the nature of gene action in prokaryotic and eukaryotic cells.
Course Content	The course includes cell, Mendelian genetics, extensions of Mendelian genetics, central dogma of molecular biology, gene mutation and repair mechanisms an recombinant DNA technology.
Course Learning Outcomes	After successfully completing this course, the student will be able to: 1. Explain the importance of understanding genetics 2. Define the following terms; Chromosome, Gene, Gene product, Allele, Genotype, Phenotype, Mitosis and Meiosis 3. Define and explain the significance of "crossing over" and "random assortment" during meiosis 4. Explain how the number of chromosomes changes during male and female gametogenesis and fertilization. 5. Explain the principles of inheritance as formulated by Mendel. 6. Explain the principles of extensions to Mendelian inheritance, including multiple alleles, lethal alleles, gene interactions, and sex-linked transmission.. 7. Define the following terms; Homozygous, Heterozygous, Dominant, Recessive, Co-dominance, Sex-linked inheritance 8. Demonstrate how to predict the possible genotypes that could occur in an offspring, provided one knows the genotype of the two parents. 9. Explain the basic aspects of the flow of genetic information from DNA to proteins. 10. Explain how DNA encodes genetic information 11. Explain the molecular mechanisms of translation 12. Explain how translation occur in prokaryotes and eukaryotes 13. Explain the structure and function of genes and the organization of the genome 14. Explain what a mutation is

WEEKLY COURSE FLOW

Week	Topics	Learning Activities	Instruction Methods, Technics and Approaches
1. Week	Introduction to Genetics. Genetics progressed from Mendel to DNA in less than a century and the impact of Biotechnology is continually expanding.	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
2. Week	Mitosis and Meiosis and their comparison. Mitosis partitions chromosomes into dividing cells. Meiosis creates haploid gametes and enhances genetic variation in species.	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
3. Week	Mendelian Genetics, Mendel's first three postulates.	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
4. Week	Punnett Squares, Testcross, Monohybrid, dihybrid and trihybrid cross. Chi-Square Analysis in Genetic Data	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
5. Week	Extensions of Mendelian Genetics. Incomplete, or partial, dominance, lethal alleles, sex linkage genes, environment controlled gene	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
6. Week	Chromosome mapping and segregation of genes linked on the same chromosome	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
7. Week	Population and evolutionary genetics , the Hardy-Weinberg law and mutation creates new allele in a gene pool	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
8. Week	DNA structure, replication and recombination, DNA organization in chromosome	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
9. Week	The genetic code and transcription and RNA polymerase enzyme.	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
10. Week	Differences between prokaryotes and eukaryotes transcription, intron and exon sequence in eukaryotic genes and processing eukaryotic RNA	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
11. Week	Translation and proteins, Ribosome and tRNA structure and main steps of translation	Presentation (Including Preparation Time) Scientific	Lecture; Question Answer Brainstorming; Colloquium

		Activity (Web Search, Library Work, Observation etc.)	
12. Week	Diverse role of proteins	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
13. Week	Gene mutation, DNA repair and transposition	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium
14. Week	Introduction to Recombinant DNA technology.	Presentation (Including Preparation Time) Scientific Activity (Web Search, Library Work, Observation etc.)	Lecture; Question Answer Brainstorming; Colloquium

SOURCES USED IN THIS COURSE

Recommended Sources
William S. Klug , Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino , Darrell J. Killian (2019) Concepts of Genetics, Pearson Education, Inc.
Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick (2018)Lewin's Genes XII, Jones & Bartlett Learning; 12 edition
T. A. Brown (2016) Gene Cloning and DNA Analysis: An Introduction, Wiley-Blackwell
Larry Snyder and Wendy Champness (2007) Molecular Genetics of Bacteria, AMS Press

RELATIONS WITH EDUCATION ATTAINMENT PROGRAM COURSE COMPETENCIES

Program Requirements	Contribution Level	DK1	DK2	DK3	DK4	DK5	DK6
PY1	0	4	3	4	5	4	3
PY5	4	3	3	4	4	4	3
PY13	4	3	4	4	4	3	4
PY15	4	3	4	4	4	3	5

*DK = Course's Contrubution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

MEASUREMENT AND EVALUATION / ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Total weeks*Hours per week)	14	2	28
Homework	4	1	4

Presentation (Including Preparation Time)	4	2	8
Project (Including Preparation and presentation Time)	1	2	2
Report (Including Preparation and presentation Time)	3	0.5	1.5
Activity (Web Search, Library Work, Trip, Observation, Interview etc.)	4	1	4
Midterm Exam	1	4.5	4.5
Final Exam	1	8	8
Total Workload			60
Total Workload / 30 (s)			2.00
ECTS Credit of the Course			2