GENETIC

1	Course Title:	GENETIC	
2	Course Code:	VET1019	
3	Type of Course:	Compulsory	
4	Level of Course:	First Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	2.00	
8	Theoretical (hour/week):	2.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	English	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç.Dr. ÖZDEN ÇOBANOĞLU	
15	Course Lecturers:	Doç. Dr. Sena ARDIÇLI Araş. Gör. Dr. Deniz DİNÇEL	
16	Contact information of the Course Coordinator:	Doç. Dr. Özden ÇOBANOĞLU e-mail: ocobanoglu@uludag.edu.tr U.Ü. Veteriner Fakültesi Genetik Anabilim Dalı Nilüfer/BURSA	
17	Website:		
18	Objective of the Course:	This course covers principles of prokaryotic and eukaryotic genetics. In this course, students will expand on the basic knowledge of genetics. This will involve learning new terminology and new core concepts about the principle of genetics which will be the basis for the other classes during their education. They will able to apply the general concept of genetics to veterinary science. The molecular basis of heredity, chromosome structure, patterns of Mendelian and non-Mendelian inheritance, and biotechnological applications will be covered in this course. Thus, the course provides the students with a review of analytical, molecular and cellular genetics along with new developments. Upon successful completion of this course, students should be able to recognize and describe genetic phenomena and demonstrate knowledge of important genetic principles.	
19	Contribution of the Course to Professional Development:		
20	Learning Outcomes:		
		1	Understand the principles of inheritance as formulated by Mendel.
		2	Apply the principles of extensions to Mendelian inheritance, including codominance, gene interactions, epistasis, multiple alleles, pleiotropy, lethal alleles, penetrance and sex-linked transmission.
		3	Learn about cell division mechanisms in prokaryotic and eukaryotic organisms. Analyze basic genetic data using statistical procedures.
		4	Understand and relate the structure and function of the DNA and RNA molecules, realize their functional roles in encoding genetic material and obtain knowledge about gene expression.
		5	Able to describe the basic aspects of the flow of genetic information from DNA to proteins by central dogma.

	6	Distinguish the chromosomal number among different species and gain a cause and an effect of changes in chromosome number and structure. Learn how to identify and classify DNA mutations.
	7	Understand gene transfer mechanisms in prokaryotic organisms and learn how to apply recombinant DNA technology to animal genomes theoretically.
	8	Learn about gene regulation with emphasis on repressible vs. inducible operon systems.
	9	Get information about basic and third generation DNA sequencing methodologies.
	10	Obtain information about genetic markers and how to apply these techniques to animal breeding.

21	Course Content:

Course Content:

Week	Theoretical	Practice
1	Introduction to the Course and Milestones of Genetics; Mendelian Genetics: The chromosomal basis of inheritance, Mendel's principles of segregation, and independent assortment, monohybrid, dihybrid and trihybrid crosses.	
2	Chi-square Test for Mendelian Inheritance: Statistical methods to describe the mode of inheritance in monohybrid and dihybrid crosses, the laws of probability to statistically	
3	Variations on Mendelian Inheritance I: and examples of non-Mendelian inheritance; like incomplete dominance, co-dominance	
4	Exceptions on Mendelian Genetics II: of non-Mendelian inheritance, like pleiotropy, multiple alleles, polygenic inheritance, environmental effects, and genetic heterogeneity	
5	Sex-Linked Inheritance: linkage, X-chromosome inactivation, dosage compensation, cytoplasmic inheritance, genetic maternal effect, sex-influenced characteristics and pedigree analysis.	
6	The Cell Division; Mitosis and Meiosis: Basic concept about cell division and genetics, prokaryotic cell division, eukaryotic cell cycle, mitosis, cytokinesis, regulation of the cell cycle, meiosis, crossing over, a cause of genetic variation, gametogenesis; spermatogenesis and oogenesis.	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	2.00	28.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	10	1.00	10.00
Homeworks	0	0.00	0.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	10.00	10.00
Others	0	0.00	0.00
Final Exams	1	12.00	12.00
Total Work Load			60.00
Total work load/ 30 hr			2.00
ECTS Credit of the Course			2.00

7	Linkage and Chromosomal Mapping: Linkage and recombination, crossing over, chromosome theory, a genetic map of the Drosophila melanogaster, linkage mapping in dihybrid and trihybrid cross by recombination frequencies between genes, interference, and coefficient of coincidence.	
8	Identifying DNA and RNA as the Genetic Material: Search for genetic material; the discovery of DNA by Griffith's Transformation Experiment, Avery, MacLeod and McCarty's experiments, Hershey-Chase bacteriophage experiment, and a discovery of RNA by Tobacco Mosaic Virus (TMV) experiment.	
9	The Structure and Analysis of DNA and RNA: Structure of nucleic acid, properties of pyrimidines and purines, the anatomy of DNA, a discovery of the structure of DNA, the DNA double helix as Watson and Crick model, polymorphism of DNA, structural features of DNA and a structure of RNA	
10	DNA Packing in Prokaryotic and Eukaryotic Chromosomes: DNA condensation, DNA supercoiling, nucleosomes, eukaryotic chromosomal organization, a structure of chromatin, chromosome folding, DNA packing. Gene Expression and Regulation: Repressible vs. inducible operon systems; Lac Operon and Tryptophan Operons in E. coli.	
11	DNA Replication in Prokaryotes and Eukaryotes: Models for DNA replication, Meselson-Stahl experiment, a mechanism of DNA replication in prokaryotes, replication of DNA in eukaryotes, enzymes required for replication, directionality of synthesis in DNA strands, DNA repair system, editing, and proofreading of DNA.	
12	The Central Dogma; Transcription, Translation and Protein Synthesis: Defining central dogma of molecular biology, transcription, RNA processing, genetic code, wobble base pairing, translation, protein synthesis, the structure of amino acid, principles of polarity in amino acid.	

13	The Genetic Mutations: Cause of mutation, types of mutations; spontaneous mutations, single base substitution and frameshift mutations, chromosomal disorders, nondisjunction in autosomal chromosomes, trisomies, nondisjunction of X chromosomes and induced mutations Genetic Transfer in Bacteria: Transformation, transduction, and conjugation, plasmid structure in bacteria. Recombinant DNA Technology: Type of vectors, techniques of recombinant DNA technology; electroporation, protoplast fusion, and injection: gene gun and microinjection.	
14	DNA Sequencing Techniques: Basic methods for sequencing; Maxam-Gilbert and Sanger methods, Whole genome sequencing and New DNA sequencing methods Molecular Markers: Describing the principles of Polymerase Chain Reaction (PCR) and their applications with molecular markers in animal breeding studies.	

22	Textbooks, References and/or Other Materials:	1. Veteriner Genetik, Odabaşioglu F. İkinci Basim. Lazer Ofset MatbaaTesisleri San.Tic. Ltd. Şti. Ankara, 2012. 2. Principles of Genetics. Sunstad D.P., Simmons M.J., and Jenkins J.B. John Wiley and Sons Inc. New York, USA, 1997. 3. An Introduction to Genetic Analysis. Griffiths A.J.F., Miller J.H., Suzuki D.T., Lewontin R.C., Gelbart W.M. 5th Edition. W. H. Freeman and Company. New York, USA, 1993. 4. Genetik. Yildirim A., Karadag Y., Kandemir N., Sakin M.A. 2. Baski. Nobel Yayin Dagitim, Ankara, 2010. 5. Genetic Class Notes. Cobanoglu O. Bursa Uludag Univ., Faculty Veterinary-Medicine. Bursa, 2017.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	40.00
Quiz	1	10.00
Home work-project	0	0.00
Final Exam	1	50.00
Total	3	100.00
Contribution of Term (Year) Learning Activities to Success Grade		50.00
Contribution of Final Exam to Success Grade		50.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		

24	**ECTS / WORK LOAD TABLE**

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	5	3	1	1	5	5	3	2	3	2	2	4	0	0	0	0
ÖK2	5	3	1	3	5	5	2	2	2	2	4	5	0	0	0	0
ÖK3	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
ÖK4	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
ÖK5	5	3	1	1	5	5	3	2	3	2	2	4	0	0	0	0
ÖK6	5	3	1	3	5	5	2	2	2	2	4	5	0	0	0	0
ÖK7	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
ÖK8	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
ÖK9	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
ÖK10	5	3	1	2	5	5	2	3	4	1	4	5	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**		**2 low**		**3 Medium**		**4 High**			**5 Very High**						