

UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
Tel. 01/ 2390 224
Division: Animal Production and Biotechnology
Department / Clinic: Department of Animal Breeding and Livestock Production
Email: susic@vef.hr
Register no.: 61-09-2018-174
File no.:
Zagreb, August 31th 2018

COURSE SYLLABUS

Course name: **Animal Breeding and Production** (3rd semester)

Academic year 2018-2019

Course leader: Velimir Sušić, PhD, Full Professor (permanent)

Teachers:

Associate teachers: Anamaria Ekert Kabalin, PhD, Full Professor
Sven Menčik, PhD, Assistant Professor
Maja Maurić, PhD, Assistant Professor
Ivan Vlahek, VMD

First day of classes: November 12th 2018

Last day of classes: January 7th 2019

Timetable for LECTURES academic year 2018-2019

LECTURES				
Date	Methodological unit	Teacher	Location / time	Literature
12.11.2018.	Animal breeding - introduction, definition and importance. Animal breeding traits - measurability and economic value. General and special animal breeding traits. Inheritance and variability of animal breeding traits. Phenotype equation. Phenotype/genotype of qualitative and quantitative traits. Phenotypic variability of breeding traits. Genotype determination of qualitative and quantitative breeding traits.	Velimir Sušić, PhD, Full Professor	Department of Animal Breeding and Livestock Production / 12.00 -14.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jersey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, McGonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics in domestic animals, 2010.
13.11.2018.	Introduction to genetic	Velimir Sušić, PhD, Full		Lasley, J.F.: Genetics of Livestock

	improvement of animals by different breeding methods. Breeding population - genetic and genotype structure. Animal improvement by new gene combinations and/or gene frequency change. Methods of animal breeding – pureblood breeding, crossbreeding, bastarding. Biotechnological methods in animal improvement – artificial insemination, multiple ovulation and embryo transfer, cloning, semen sexing, gene tests.	Professor	Department of Animal Breeding and Livestock Production / 13.00 -15.00	Improvement. Prentice-Hall, Inc., New Jersey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, McGonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics in domestic animals, 2010.
14.11.2018.	Introduction to genetic improvement of animals by selection. Selection of animals with regard to qualitative traits. Natural and artificial selection of animals. Methods of selection. The frequency of genotypes and genes in the animal populations. The equilibrium of genotypes and genes in the population. Factors that can change the frequency of genotypes and genes in the population. Harmful genes - degeneration, predisposition to diseases. Major genes – muscular hypertrophy, fertility.	Maja Maurić, PhD, Assistant Professor	Department of Animal Breeding and Livestock Production / 11.00 -13.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jersey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, McGonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics

				in domestic animals, 2010.
22.11.2018.	Selection of animals with regard to quantitative traits (1). Causes of variability of quantitative traits. Statistical indicators in the estimation of quantitative traits variability. Relationship and repeatability of quantitative traits. Quantitative traits and environmental impact. Heritability.	Sven Menčík, PhD, Assistant Professor	Department of Animal Breeding and Livestock Production / 14.00 -16.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jersey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, McGonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics in domestic animals, 2010.
28.11.2018.	Selection of animals with regard to quantitative traits (2). Setting the selection criteria. Selection differential. Assessment of the effect of selection. Factors that influence effect of selection: herd renewal, generation interval, effects of crossbreeding.	Sven Menčík, PhD, Assistant Professor	Department of Animal Breeding and Livestock Production / 10.00 -12.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jersey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, McGonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics

				in domestic animals, 2010.
4.12.2018.	Introduction to evaluation of the breeding value (1) - definition, presentation and interpretation of the breeding value. Differences between genotype and breeding value. Sources of data and the accuracy of the estimation of the breeding value.	Anamaria Ekert Kabalin, PhD, Full Professor	Department of Animal Breeding and Livestock Production / 8.00 -10.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jerxey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, Mcgonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006. Jiang & Ott: Reproductive genomics in domestic animals, 2010.
7.12.2018.	Introduction to evaluation of the breeding value (2) - methods for estimation of breeding values; breeding value in different animal species.	Anamaria Ekert Kabalin, PhD, Full Professor	Department of Animal Breeding and Livestock Production / 8.00 -10.00	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jerxey, 1987. Axford, Bishop, Nicholas & Owen: Breeding for disease resistance in farm animals, 2000. Vella, Shelton, Mcgonagle & Stanglein: Robinsons: Genetics for cat breeders and veterinarians, 2003. Muir & Aggrey: Poultry genetics, breeding and biotechnology, 2003. Root Kustritz: The dog breeders guide to successful breeding and health management, 2006.

				Jiang & Ott: Reproductive genomics in domestic animals, 2010.
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Timetable for SEMINARS academic year 2018-2019

SEMINARS					
Date	Methodological unit	Teacher	Group	Location / time	Literature
15.11.2018.	Programs to improve the genetic base of different animal species: general and special traits in breeding of cattle, sheep and goats	Velimir Sušić, PhD, Full Professor		Department of Animal Breeding and Livestock Production / 11.00 -13.00	Written preparations for specific seminar topics
21.11.2018.	Programs to improve the genetic base of different animal species: general and special traits in breeding of pigs and poultry	Sven Menčik, PhD, Assistant Professor		Department of Animal Breeding and Livestock Production / 11.00 -13.00	Written preparations for specific seminar topics
27.11.2018.	Programs to improve the genetic base of different animal species: general and special traits in breeding horses and dogs.	Anamaria Ekert Kabalin, PhD, Full Professor		Department of Animal Breeding and Livestock Production / 8.00 -10.00	Written preparations for specific seminar topics

3.12.2018.	Biotechnological methods in animal improvement – artificial insemination, multiple ovulation and embryo transfer, cloning, semen sexing, gene tests. Improvements of animal populations - breeding programs, exhibitions, licensing, regionalization, implementation of legal regulations, scientific and professional literature.	Anamaria Ekert Kabalin, PhD, Full Professor		Department of Animal Breeding and Livestock Production / 8.00 -10.00	Written preparations for specific seminar topics
6.12.2018.	Breeding programs in Croatia - cattle, sheep and goats	Maja Maurić, PhD, Assistant Professor		Department of Animal Breeding and Livestock Production / 12.00 -14.00	Written preparations for specific seminar topics
11.12.2018.	Breeding programs in Croatia – pigs and poultry	Sven Menčik, PhD, Assistant Professor		Department of Animal Breeding and Livestock Production / 14.00 -16.00	Written preparations for specific seminar topics
12.12.2018.	Breeding programs (basic concept). Breeding programs in Croatia – horses, dogs and cats.	Maja Maurić, PhD, Assistant Professor		Department of Animal Breeding and Livestock Production / 10.00 -12.00	Written preparations for specific seminar topics

Timetable for PRACTICALS academic year 2018-2019

PRACTICALS						
Date	Methodological unit	Teacher	Type of practical	Group	Location / time	Literature
19.11.2018.	Traits in animal breeding and selection: examples of values, measurement and calculations	Velimir Sušić, PhD, Full Professor			Department of Animal Breeding and Livestock production / 12.00 -14.00	Lectures and written preparations for specific practical topics
23.11.2018.	Evaluation of crossbreeding effects and inbreeding effects. Examples of calculations of heterosis effect, coefficient of inbreeding and kinship coefficient. Degenerations.	Maja Maurić, PhD, Assistant Professor			Department of Animal Breeding and Livestock Production / 8.00 -10.00	Lectures and written preparations for specific practical topics
30.11.2018.	Selection of animals with respect to qualitative traits - changes in the frequency of genes and genotypes. Examples of calculating the frequency of genotypes and genes in the animal population. Calculation of changes in the frequency of genotypes and genes after selection against homozygote and / or heterozygote.	Anamaria Ekert Kabalin, PhD, Full Professor			Department of Animal Breeding and Livestock Production / 14.00 -16.00	Lectures and written preparations for specific practical topics
5.12.2018.	Colloquium 1	Maja Maurić,				

	Topics: practicals 1, 2 and 3	PhD, Assistant Professor			Department of Animal Breeding and Livestock Production / 10.00 -12.00	Lectures Practicals 1,2 and 3
10.12.2018.	Selection of animals with regard to quantitative traits – data processing and evaluation of the selection differential. Statistical data analysis for quantitative traits. Calculation of difference (differential) generated by selection in the generation of parents.	Sven Menčík, PhD, Assistant Professor			Department of Animal Breeding and Livestock Production / 8.00 -10.00	Lectures and written preparations for specific practical topics
13.12.2018.	Selection of animals with regard to quantitative traits – evaluation of selection effect. Examples of calculations: herd renewal, generational interval, selection effect in one generation, selection effect in one year.	Sven Menčík, PhD, Assistant Professor			Department of Animal Breeding and Livestock Production / 12.00 -14.00	Lectures and written preparations for specific practical topics
14.12.2018.	Breeding value of animals - interpretation and comparison within species. Examples in cattle breeding, pig breeding and dog breeding.	Anamaria Ekert Kabalin, PhD, Full Professor			Department of Animal Breeding and Livestock Production / 12.00 -14.00	Lectures and written preparations for specific practical topics
7. 1. 2019.	Colloquium 2 Topics: practicals 5, 6 and 7	Maja Maurić, PhD, Assistant Professor			Department of Animal Breeding and Livestock Production / 13.00 -15.00	Lectures Practicals 5,6 and 7

STUDENT OBLIGATIONS

Lecture attendance	During 3 rd semester maximal number of points from this evaluation element is 2 (minimal is 1 point)	
	Lecture attendance (hours)	Number of points
	6 or less	0 (dissatisfied)
	7	1,0 (minimal)
	8	1,143
	9	1,286
	10	1,429
	11	1,572
	12	1,715
	13	1,858
	14	2,0 (maximal)
Seminars attendance	During 3 rd semester maximal number of points from this evaluation element is 6 (minimal is 4 points)	
	Seminars attendance	Number of points
	3 or less	0 (dissatisfied)
	4 seminars	4,0 (minimal)
	5 seminars	4,67
	6 seminars	5,34
	7 seminars	6,0 (maximal)
Practicals attendance	During 3 rd semester maximal number of points from this evaluation element is 2 (minimal is 1 point)	
	Practicals attendance	Number of points

	5 or less 6 7 8	0 (dissatisfied) 1,0 (minimal) 1,5 2,0 (maximal)
Active participation in seminars and practicals	During 3 rd semester maximal number of points from this evaluation element is 6 (minimal is 3 points)	
Final exam	After finishing lectures in 4 th semester students have written and oral exam	
Examination requirements	Student requirements are defined in the Regulations on the Integrated Undergraduate and Graduate Study of Veterinary Medicine. Given the above, the student must acquire a minimum number of points from all assessment elements in order to take the final exam. Article 45: a student can justifiably be absent from up to 50 % of the lectures; 30% of the seminars and 30 % of the exercises.	

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	Colloquium 1: minimal 5 points, maximal 8 points Colloquium 2: minimal 5 points, maximal 8 points
Final exams (dates)	Final exam is after finishing 4 th semester
Form of final exam	Written and oral

LITERATURE

Obligatory literature	Lasley, J.F.: Genetics of Livestock Improvement. Prentice-Hall, Inc., New Jersey, 1987.; Jiang, Ott: Reproductive genomics in domestic animals, 2010.; FAO: Marker assisted selection, 2007.; Pierce: Genetics, 2003.; Muir, Aggrey: Poultry genetics, breeding and biotechnology, 2003.; Houghton Brown, Pilliner, Davies: Horse and stable management, 2003.; Root Kustritz: The dog breeders guide to successful breeding and health management, 2006.;
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	Vella, Shelton, McGonagle, Stanglein: Robinsons genetics for cat breeders and veterinarians, 2003.
Optional literature	Lokhorst, Groot Koerkamp: Precision livestock farming, 2009.; Axford, Bishop, Nicholas, Owen: Breeding for disease resistance in farm animals, 2000.; Field, Taylor: Scientific farm animal production, 2009.; Radostits, O.M.: Herd Health. W.B. Saunders Company. Philadelphia, 2001.; Brand, Nordhuisen, Schukken: Hered health and production management in dairy practice, 1997.

OBJECTIVES AND LEARNING OUTCOMES

Course objectives	The objective of the course Animal breeding and production is to teach students of veterinary medicine how to evaluate and improve genetic basis of animals. Special attention is focused on genotype-phenotype characteristics which have influence on quality and quantity of animal products, than to the characteristics of animal resistance to diseases and animal organism -environment interactions.
Learning outcomes	Material is divided into three parts which first allow student to acquire knowledge about animal species as a result of its genetic particularities and specific environment. Then there are lessons on how to estimate genetic basis of particular traits and breeding methods how to improve this traits. Finally, in the third part students learn about different production systems and the way of using animal genetics to improve quantity and quality of production and in the same time how production influence on animal health. After successfully completion of the course students will be able to: - understand the role of genetic basis in different ways of breeding and exploiting animals - apply different methods to improve the genetic basis of animals with respect to specific breeding traits - identify various animal production systems - gather animal health and production data - analyze animal health and production data - setting the goals in cooperation with farmer - control advancement according to set goals

GRADING SCHEME

<i>Points</i>	<i>Grade</i>
Up to 59	1 (F)
60-68	2 (E)
69-76	2 (D)
77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Course leader:

Head of Department/Clinic:

Note: The course leader is required to submit a Course Syllabus to all teachers and associates pertaining to the Course.

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES,
SEMINARS and PRACTICALS**

Type of activity	Minimum number of points	Maximum number of points
Lectures attendance	3	6
Seminar attendance	4	6
Practicals attendance	4	6
Active participation in seminars and practicals	5	10
Continuous knowledge checking (mid-terms)	20	32
Final exam	24	40
TOTAL	60	100

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH LECTURES
and SEMINARS**

Type of activity	Minimum number of points	Maximum number of points
Lecture attendance	3	6
Practicals attendance	8	12
Active participation in practicals	5	10
Continuous knowledge checking (mid-terms)	20	32
Final exam	24	40
TOTAL	60	100

**GRADING AND EVALUATION OF STUDENT WORK ON COURSES WITH SEMINARS
and EXERCISES**

Type of activity	Minimum number of points	Maximum number of points
Seminar / practicals attendance	11	18
Active participation in seminars and practicals	5	10
Continuous knowledge checking (mid-terms)	20	32
Final exam	24	40
TOTAL	60	100