UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
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Basic, natural and preclinical sciences division
Department of Veterinary Biology
Email: mpopovic22@gmail.com
Register no. 61-02-200/18
Zagreb, 30.08.2017.

COURSE SYLLABUS

Course name: **Molecular Biology and Genomics in Veterinary Medicine**

Academic year 2018.-19.

Course leader: Full professor Maja Popović, DVM, PhD

Teachers:
Full professor Maja Popović DVM, PhD
Full professor Ksenija Vlahović DVM, PhD
Full professor Josip Kusak DVM, PhD
Associate professor Tomislav Gomerčić DVM, PhD,
Assistant professor Daniel Špoljarić DVM, PhD
Professor emeritus Đuro Huber, DVM, PhD
Full professor Marina Pavlak DVM, PhD

First day of class: 15.10.2018.

Last day of class: 22.11.2018.

Timetable for LECTURES academic year 2018-2019

LECTURES				
Date	**Methodological unit**	**Teacher**	**Location / time**	**Literature**
15.10.2018.	Historical aspects and future challenges	Full professor Maja Popović	12-14 h, Lecture Room Department of Veterinary Pathology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
16.10.2018.	Replication, Transcription, Translation and protein synthesis	Professor emeritus Đuro Huber	14-16 h LECTURE, Lecture Room Department of Physiology and Radiobiology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
22.10.2018.	Gene expression regulation	Professor emeritus Đuro Huber	12-13 h LECTURE, Lecture Room Department of Physics and Biophysicsy	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

Timetable for SEMINARS academic year 2018-2019

SEMINARS					
Date	**Methodological unit**	**Teacher**	**Group**	**Location / time**	**Literature**
16.10.2018.	Nucleic acids – structure and function	Professor emeritus Đuro Huber	1,2	12-14 h seminar, Lecture Room Department of Physiology and Radiobiology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
17.10.2018.	Cell cycle regulation – molecular aspects	Full professor Maja Popović, Assistant professor Daniel Špoljarić	1,2	10-12 h seminar, Lecture Room Department of Physics and Biophysics	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
18.10.2018.	Transmission of cellular signals at the molecular level	Full professor Maja Popović	1,2	8-10 h seminar, Lecture Room Department of Pharmacology and Toxicology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
22.10.2018.	Genome mutations	Professor emeritus Đuro Huber	1,2	13-15 h seminar, Lecture Room Department of Physics and Biophysics	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
23.10.2018.	DNA molecule repair mechanisms	Full professor Maja Popović	1,2	16-18 h seminar, Lecture Room Department of Physics and Biophysics	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

Timetable for PRACTICALS academic year 2018-2019

PRACTICALS						
Date	**Methodological unit**	**Teacher**	**Type of practical**	**Group**	**Location / time**	**Literature**
29.10.2018.	Evidence for gene expression; Types of nucleic acids	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	16-18 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
30.10.2018.	1. colloquium; Replication, transcription and translation	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	16-18 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

31.10.2018.	Gene mutations	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	14-16 h practicals, Lecture Room Department of Veterinary Pathology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
05.11.2018.	Methods of molecular biology and cytology; Flow cytometry; Cell culture; DNA isolation methods	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	8-10 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
6.11.2018.	**2. colloquium**; Classical genetics; Mendelian	Full professor Maja Popović, Full professor Ksenija Vlahović,	Laboratory exercises	1,2	13-15 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

	inheritance I	Professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić , Full professor Marina Pavlak				
7.11.2018.	Mendelian inheritance II; Mendelian inheritance III	Full professor Maja Popović, Full professor Ksenija Vlahović, Associate professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić Full professor Marina Pavlak	Laboratory exercises	1,2	10-12 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
9.11.2018.	Recombinant DNA technology	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip	Laboratory exercises	1,2	8-16 h practicals „Ivan Vučetić" MUP HR	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

		Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić				
12.11.2018.	**3. colloquium**; The Chromosomal basis of Mendel's rules	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	8-10 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
16.11.2018.	Determining the gene on a particular chromosome	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić,	Laboratory exercises	1,2	11-13 h practicals, Practical Hall at Department of Anatomy, Histology and Embryology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach

		Assistant professor Daniel Špoljarić				
19.11.2018.	**4. colloquium**; Multiple genes; Polygenic inheritance; Polyphenism	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	8-10 h practicals, Lecture room Department of Veterinary Pathology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
20.11.2018.	Non-Mendelian inheritance	Full professor Maja Popović, Full professor Ksenija Vlahović, Associa Full professor Josip Kusak, Associate professor Tomislav Gomerčić, Assistant professor Daniel Špoljarić	Laboratory exercises	1,2	14-16 h practicals, Lecture room Department of Veterinary Pathology	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
22.11.2018.	**5. colloquium**;	Professor emeritus Đuro	Laboratory exercises	1,2	12-14 h practicals, Practical Hall at	G.M. Cooper, R.E: Hausman (2015): The

	Population and evolutionary genetics	Huber			Department of Anatomy, Histology and Embryology	Cell: A Molecular Approach

STUDENT OBLIGATIONS

Lecture attendance	During the session student must attend 3 hours of lectures in order to gain 3 minimal points during the semester. The maximum gained number of points from this evaluation element is 6 points.
Seminars attendance	During the session student must attend 7 hours of seminars in order to gain 4 minimal points during the semester. The maximum gained number of points from this evaluation element is 6 points.
Practicals attendance	During the session student must attend 20 hours of exercise lessons in order to gain 4 minimal points during the semester. The maximum gained number of points from this evaluation element is 6 points.
Active participation in seminars and practicals	During the session at the time of exercises student must do provided tasks from 15 programming exercises and 5 seminars and for a completed task she/he gets a signature from the lecturer. During the session student must gain at least f 5 points. Maximal number of points gained from this evaluation element is 10.
Final exam	The final exam starts with a student's short analysis of results gained from the first four types of activities of attending lecture. Questions in the final exam will be put in a way that a student can answer in writing. The maximum number of points that can be gained from the final exam is 60 points. Student must show at least a sufficient knowledge at the final exam, with no regard to gained number of points from the first four evaluation elements, which could be higher than 36. The minimal number of points a student must gain at the final exam is 36 in order to gain minimal number of 24 points. In case a student does not satisfy at the final part of the exam, the lecturer determines time for reexamination. Regardless of a fact that a student gained the number of points from the first four evaluation elements on the basis of makeup preliminary exam or not, the same rules are valid for forming the final mark. The final mark is formed on the basis of total sum from all five evaluation elements.
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)	During the session 5 preliminary exams will be organized at the time of exercises each of them consisting 7 tasks or questions. Each correctly done task or well answered question is worth 1 point. In context of this evaluation element it is possible to gain the maximum of 35 points. Student must gain total of 22 points from the preliminary exams in order to gain minimum of 20 points. The total gained number of points from this evaluation element is 32 points. Student who does not gain minimum of 22 points during the session has right to take a makeup preliminary exam which will comprise material from all programming exercises and will be organized upon completion of the teaching in the session. Total number of points at the preliminary exam is 35. Student who does the makeup exam with better-than 50% results has right to take the final exam.
Final exams (dates)	9/11/2018.; 5/12/2018.; 18/1/2019.; 1/2/2019.; 15/2/2019.
Form of final exam	Written exam

LITERATURE

Obligatory literature	G.M. Cooper, R.E: Hausman (2015): The Cell: A Molecular Approach
Optional literature	R. H Tamarin (2002) : Principles of genetics. McGraww Hill, Boston, New York, London G.B Johnson (2000): The living world. McGraww Hill, Boston, New York, London, 2000

OBJECTIVES AND LEARNING OUTCOMES

Course objectives	Students will be able to recognize importance and contribution of genomics and proteomics in veterinary medicine and biotechnology. They will be able to comprehend and check basic laws of inheritance at the molecular level, from phenotype expression in prokaryotes and animals, up to qualitative and quantitative phenogenetics of artificial selection. They will acquire knowledge about molecular processes of informative macromolecules up to genome expression in prokaryotes and animals. They will be able to recognize causes and effects of spontaneous and induced mutations in animals. They will acquire with the role and biomedical importance of molecular signals and differential molecules involved in the regulation of cell and life cycle in animals, particularly during their embryomic development. Students will be able to recognize the methods of molecular biology applicable in veterinary medicine and comprehend their importance in prevention, diagnostic and therapy, as well as in the veterinary biotechnology. They will realize possible risks of applying recombinant DNA technology for health and welfare of animals and humans, as well as for environment.

Learning outcomes	1. Understanding of molecular processes of replication, transcription and translation of animal information macromolecules 2. Understanding health and ecological justification and risk of using transgenic animal organisms and cells, biotechnological preparations (cytokines, hormones, enzymes, vaccines, medications) and genetically modified food of animal origin 3. Understanding genetic disorders of animals of interest for veterinary medicine 4. Selecting molecular-genetic method for preventive, diagnostic and therapy of ill animal

GRADING SCHEME

Points	*Grade*
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: Full professor Maja Popović DVM, PhD

Head of Department/ of biology: Associate professor Tomislav Gomerčić DVM, PhD

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 EXCERCISES

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