UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
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Division: Division for Animal Production and Biotechnology
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Register no.:
File no.: 251-61-14/21-17
Zagreb, 1st of February, 2021.

COURSE SYLLABUS

Course name: Biology and Pathology of Beneficial Insects

Academic year 2020-21

Course leader: Professor Ivana Tlak Gajger

Teachers: Professor Ivana Tlak Gajger
Assistant Professor Krešimir Matanović

First day of classes: 22th of February 2021.

Last day of classes: 28th of May 2021.

Timetable for LECTURES academic year 2020-2021

LECTURES				
Date	**Methodological unit**	**Teacher**	**Location / time**	**Literature**
22.02.2021.	Introduction. Species and races of honeybees. Honeybee colony. Development of honeybee brood. Apian products.	Professor Ivana Tlak Gajger	Department for Biology and Pathology of Fish and Bees 10 - 12	No. 1, 3, 4, 6, 7
23.02.2021.	Life and development of honeybee colony.	Professor Ivana Tlak Gajger	Department for Biology and Pathology of Fish and Bees 10 - 12	No. 1, 3, 4, 6, 7
05.03.2021.	Role of veterinarians in beekeeping. Recognizing of diseases signs. Legislation. Bacterial diseases. American foulbrood.	Professor Ivana Tlak Gajger	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 1
08.03.2021.	European foulbrood. Virus diseases. Nosemosis.	Professor Ivana Tlak Gajger	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 1
09.03.2021.	Parasitic diseases (Varroosis, Acarosis); Fungal diseases (Chalkbrood disease, Stonebrood disease).	Assistant Professor Krešimir Matanović	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 1
16.03.2021.	Non-infection diseases. Toxicology in beekeeping. Pests (*Aethina tumida*).	Professor Ivana Tlak Gajger	Department for Biology and Pathology of Fish and Bees 8 - 9	No. 1, 5

Timetable for PRACTICALS academic year 2020-2021

PRACTICALS						
Date	**Methodological unit**	**Teacher**	**Type of practical**	**Group**	**Location / time**	**Literature**
24.02. 2021.	Hives. Beekeeping equipment. Beeswax combs and comb foundations.	Professor Ivana Tlak Gajger	Laboratory	1	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 7, 2
25.02. 2021.	Anatomy of honeybee I (Exoskelet, legs, wings; organs for feeding).	Professor Ivana Tlak Gajger	Laboratory	1	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 2
26.02. 2021.	Anatomy of honeybee II (Alimentary channel, respiratory system, circulatory system, nervous and sensory system).	Professor Ivana Tlak Gajger	Laboratory	1	Department for Biology and Pathology of Fish and Bees 12 - 14	No. 2
03.03. 2021	Anatomy of honeybee III (Eye, wax glands, scent glands, sting and poisoning gland).	Professor Ivana Tlak Gajger	Laboratory	1	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 2
11.03. 2021.	Diagnostic, control and eradication of honeybee diseases I.	Professor Ivana Tlak Gajger	Clinical	1	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 1, 5

12.03. 2021.	Diagnostic, control and eradication of honeybee diseases II.	Professor Ivana Tlak Gajger	Clinical	1	Department for Biology and Pathology of Fish and Bees 14 - 16	No. 1, 5
15.03. 2021.	Morphological identification of exotic parasites and pests (*Aethina tumida*; *Tropilaelaps* spp.).	Professor Ivana Tlak Gajger	Clinical	1	Department for Biology and Pathology of Fish and Bees 8 - 10	No. 1, 5
18.03. 2021.	Biology and pathology of bumblebees and solitary bees – *Osmia* spp.	Assistant Professor Krešimir Matanović	Clinical	1	Department for Biology and Pathology of Fish and Bees 8 - 10	student notes
21.05. 2021.	Clinical examination of honeybee colony I.	Professor Ivana Tlak Gajger	Field work	1	Apiary I 7 - 18	No. 1
28.05. 2021.	Clinical examination of honeybee colony II.	Professor Ivana Tlak Gajger	Field work	1	Apiary II 7 - 18	No. 1

STUDENT OBLIGATIONS

Lecture attendance	Attending lectures 3 – 6 points (1 lecture hour equals 0.54 point).
Practicals attendance	Attending practicals: 8-12 points. Student must attend at least 17 hours of practicals to achieve minimum of 8 points.
Active participation in seminars and practicals	Participation at exercises 5 – 10 points (participation at exercises will be evaluated with short oral tests with 5 points at least).
Final exam	Final exam - oral: 24-40 points, (5 questions: 1 question equals 8 points).
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)	Continuous knowledge checking 20 - 32 points (preliminary exam (20 questions), (1 question equals 1.6 points)).
Final exams (dates)	10.06.2021., 25.06.2021., 09.07.2021., 08.09.2021. and 23.09.2021.
Form of final exam	Oral

LITERATURE

Obligatory literature	1.Vidal-Naquet, N. (2015): Honeybee Veterinary Medicine: *Apis mellifera* L. 5m Publishing Benchmark House, Sheffield, UK.
	2.Snodgrass, R. E., E. H. Erikson (2005): The anatomy of the honey bee. The hive and the honey bee (ed. J. M. Graham). Dadant and Sons, Hamilton, USA.
	3.Southwick, E. E. (2005): Physiology and social physiology of the honey bee. The hive and the honey bee (ed. J. M. Graham). Dadant and Sons, Hamilton, USA.
	4.Gary, N. E. (2005): Activities and behavior of honey bees. The hive and the honey bee (ed. J. M. Graham). Dadant and Sons, Hamilton, USA.
	5.Bailey, L., B. Ball (1991): Honey bee pathology. Academic Press, London.
Optional literature	6.Jürgen Tautz (2008): The buzz about bees – biology of a superorganism. Springer, Germany. 7.Caron, D. M., L.J. Connor (2013): Honey bee biology and beekeeping. Wicwas Press, Pennsylvania, USA.

OBJECTIVES AND LEARNING OUTCOMES

Course objectives	During lectures and exercises student must obtain general knowledge about honeybee breading in order to comprehend the importance and role of veterinarians in recognizing and controlling diseases. The skills which one must accomplish are proper examination of honeybee colonies, recognition of clinical signs, sampling and sending the materials for laboratory procedures, and also apply prevention and therapy of honeybee diseases.
Learning outcomes	- Annotate the role of honeybee in natural ecosystems - Explain manner of life and activities of honeybee colony, construction of combs and development of brood - Recognize different types of hives, feeders and water suppliers, and beekeeping equipment - Describe individual organs of health honeybee and alterations caused by diseases - Distinguish diseases of brood and adult bees based on characteristic signs - Apply basic clinical and diagnostic techniques with aim to appoint suspicion on honeybee diseases - Define role of veterinarian in procedure of sampling and sending materials for laboratory examinations, treatments and sanitation of diseases

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:

Head of Department/Clinic:

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