UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
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Division: ANIMAL PRODUCTION AND BIOTECHNOLOGY
Organizational unit: BIOLOGY AND PATHOLOGY OF FISH AND BEES
E-mail of the course leader: itlak@vef.unizg.hr
Register No of the organisational unit: 251-61-14/25-20
Zagreb, 12/2/2025

COURSE SYLLABUS

Course name: Biology and Pathology of Beneficial Insects
Academic year 2024/2025

Course leader: Full Professor Ivana Tlak Gajger

Deputy course leader: Associate Professor Krešimir Matanović

Teachers: Full Professor Ivana Tlak Gajger
Associate Professor Krešimir Matanović
Valerija Benko PhD

First day of classes: 3/3/2025
Last day of classes: 29/5/2025

Activities - Biology and Pathology of Beneficial Insects (1/3)

Start Date	Start T	End Ti	Subject	Group	Note	Length	Instructor	Room
03/03/2025	8:15	9:45	p01 Introduction	8E-1, 8E-2, 8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
03/03/2025	12:15	13:45	p02 Life and development of honeybee colony	8E-1, 8E-2, 8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
04/03/2025	10:15	11:45	v01 Hives. Beekeeping equipment	8E-1, 8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
04/03/2025	13:45	15:15	v01 Hives. Beekeeping equipment	8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
10/03/2025	8:15	9:45	v02 Anatomy of honeybee I	8E-1, 8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
10/03/2025	14:15	15:45	v02 Anatomy of honeybee I	8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
11/03/2025	8:00	9:30	v03 Anatomy of honeybee II	8E-1, 8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
11/03/2025	13:30	15:00	v03 Anatomy of honeybee II	8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
12/03/2025	13:15	14:45	p03 Role of veterinarians in beekeeping	8E-1, 8E-2, 8E-3		1:30	Tlak Gajger I.	P_fizika
13/03/2025	8:00	9:30	p04 European foulbrood	8E-1, 8E-2, 8E-3		1:30	Tlak Gajger I.	P_fizika
21/03/2025	16:15	17:45	v04 Anatomy of honeybee III	8E-1, 8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
24/03/2025	8:15	9:45	v04 Anatomy of honeybee III	8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
26/03/2025	9:00	10:30	v05 Diagnostic, control and eradication of honeybee diseases I	8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
27/03/2025	8:00	9:30	p05 Parasitic diseases	8E-1, 8E-2, 8E-3		1:30	Matanovic K.	P_ribe i pcele
27/03/2025	11:30	13:00	v05 Diagnostic, control and eradication of honeybee diseases I	8E-1		1:30	Tlak Gajger I.	P_ribe i pcele

Activities - Biology and Pathology of Beneficial Insects (2/3)

Start Date	Start T	End Ti	Subject	Group	Note	Length	Instructor	Room
28/03/2025	13:15	14:45	v05 Diagnostic, control and eradication of honeybee diseases I	8E-3		1:30	Tlak Gajger I.	P_ribe i pcele
03/04/2025	8:00	8:45	p06 Non-infection diseases	8E-1, 8E-2, 8E-3		0:45	Tlak Gajger I.	P_ribe i pcele
03/04/2025	9:30	11:00	v06 Diagnostic, control and eradication of honeybee diseases II	8E-2, V_ribe i pcele		1:30	Tlak Gajger I.	P_ribe i pcele
08/04/2025	8:00	9:30	v06 Diagnostic, control and eradication of honeybee diseases II	8E-1, V_ribe i pcele		1:30	Tlak Gajger I.	P_ribe i pcele
09/04/2025	14:30	16:00	v06 Diagnostic, control and eradication of honeybee diseases II	8E-3, V_ribe i pcele		1:30	Tlak Gajger I.	P_ribe i pcele
05/05/2025	13:00	14:30	v07 Biology and pathology of bumblebees	8E-3		1:30	Matanovic K.	P_ribe i pcele
07/05/2025	13:15	14:45	v07 Biology and pathology of bumblebees	8E-2		1:30	Matanovic K.	P_ribe i pcele
07/05/2025	15:00	16:30	v07 Biology and pathology of bumblebees	8E-1, V_ribe i pcele		1:30	Matanovic K.	P_ribe i pcele
09/05/2025	8:15	9:45	v08 Morpholoical identification of exotic parasites	8E-2		1:30	Tlak Gajger I.	P_ribe i pcele
09/05/2025	15:00	16:30	v08 Morpholoical identification of exotic parasites	8E-3		1:30	Tlak Gajger I.	P_ribe i pcele

Activities - Biology and Pathology of Beneficial Insects (3/3)

Start Date	Start T	End Ti	Subject	Group	Note	Length	Instructor	Room
12/05/2025	11:45	13:15	v08 Morpholoical identification of exotic parasites	8E-1		1:30	Tlak Gajger I.	P_ribe i pcele
13/05/2025	13:15	14:15	Biology and Pathology of Beneficial Insects	8E-1, 8E-2, 8E-3	Kolokvij	1:00	Tlak Gajger I.	P_ribe i pcele
21/05/2025	8:00	16:00	v09 Field work- Apiary I	8E-3		8:00	Tlak Gajger I.	
21/05/2025	8:00	16:00	v09 Field work- Apiary I	8E-1, 8E-2		8:00	Tlak Gajger I.	
29/05/2025	8:00	16:00	v10 Field work- Apiary II	8E-3		8:00	Tlak Gajger I.	
29/05/2025	8:00	16:00	v10 Field work- Apiary II	8E-1, 8E-2		8:00	Tlak Gajger I.	
10/06/2025	14:00	15:00	Biology and Pathology of Beneficial Insects	8E-1, 8E-2, 8E-3	Kolokvij - I. ponavljanje	1:00	Tlak Gajger I.	P_ribe i pcele
Total: 32						**72:15**		

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. Note: due to the specifics of the life of the honeybee colony during the active beekeeping season, it is not possible to compensate for the absence from field classes
Active participation in seminars and practicals	Participation at exercises: 5-10 points (evaluated with short oral tests)
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 studying in the University Integrated Undergraduate and Graduate Study Programme *Veterinary Medicine* (Article 64). Given the above, the student may be absent from classes in an individual course up to 50 percent of the class hours of lectures, 30 percent of the class hours of seminars, and 30 percent of the class hours of practicals. An exception is any course with a small number of hours of specific teaching form (12 hours or less per semester), where absence of greater than 50 percent is permitted, with mandatory justification of the absence and that all missed classes are made up in line with the conditions set by the head of the course.

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	Continuous knowledge checking (1 preliminary exam – 20 questions): 20-32 points (1 question equals 1.6 points)
Final exams (dates)	1/7/2025, 10/7/2025, 10/9/2025 and 19/9/2025
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. 6. TLAK GAJGER, I. (2021): Honeybee Diseases in Modern Production. University of Zagreb Faculty of Veterinary Medicine, Zagreb.
Optional literature	6. TAUTZ, J. (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.

Course BIOLOGY AND PATHOLOGY OF BENEFICIAL INSECTS

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	- argue the role of honey bees in natural ecosystems - differentiate the types of hives, feeders, watering containers and beekeeping tools - manage the procedures of taking and sending samples for laboratory examination, treatment and remediation of honeybee diseases

Course: BIOLOGY AND PATHOLOGY OF BENEFICIAL INSECTS

GRADING SCHEME

Points	*Grade*
Up to 59	1 (F)
60-76	2 (D,E)
77-84	3 (C)
85-92	4 (B)
93-100	5 (A)

Course leader

Head of organizational unit:

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