UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzelova 55
Tel. 01/2390-153
Division: ANIMAL PRODUCTION AND BIOTECHNOLOGY AND PRE-CLINICAL SCIENCES DIVISION
Organizational unit: BIOLOGY AND PATHOLOGY OF FISH AND BEES
E-mail of the course leader: kresimir.matanovic@vef.unizg.hr
Register No of the organisational unit: 251-61-14/26-15
Zagreb, 29/1/2026

COURSE SYLLABUS

Course name: Biology and Pathology of Beneficial Insects
Academic year 2025/2026

Course leader: Associate Professor Krešimir Matanović

Deputy course leader: Full Professor Ivana Tlak Gajger

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

First day of classes: 25/2/2026
Last day of classes: 22/5/2026

Activities - Biology and Pathology of Aquatic Organisms (1/2)

Start Date	Start T	End Ti	Course	Group	Note	Length	Instructor	Room
12/03/2026	8:15	9:45	p01 Introduction, The aquatic environment, Breeding	8E-1, 8E-2, 8E-3		1:30	Matanović K.	P_ribe i pčele
16/03/2026	15:00	16:30	v01 Systematic of freshwater fish	8E-1, 8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
19/03/2026	12:15	13:45	p02 Gonads,Artificial spawning of common carp	8E-1, 8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
20/03/2026	8:00	9:30	v02 Systematic of marine fish	8E-1, 8E-2, 8E-3		1:30	Matanović K.	P_ribe i pčele
23/03/2026	13:30	15:00	v03 Fish anatomy I	8E-1, 8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
25/03/2026	8:00	9:30	v04 Fish anatomy II	8E-1, 8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
30/03/2026	13:15	14:45	v05 Dissection of common carp and rainbow trout	8E-1		1:30	Gjurčević E.	P_ribe i pčele
30/03/2026	16:00	17:30	v05 Dissection of common carp and rainbow trout	8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
31/03/2026	8:15	9:45	p03 Artificial spawning of salmonids,Bacterial fish diseases	8E-1, 8E-2, 8E-3		1:30	Matanović K.	P_ribe i pčele
01/04/2026	8:15	9:45	v06 Dissection of marine fish and molluscs anatomy	8E-2, 8E-3		1:30	Matanović K.	P_ribe i pčele
01/04/2026	13:15	14:45	v06 Dissection of marine fish and molluscs anatomy	8E-1		1:30	Matanović K.	P_ribe i pčele
14/04/2026	15:30	17:00	p04 Viral fish diseases	8E-1, 8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
17/04/2026	15:45	17:15	p05 Parasitic fish diseases I	8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
21/04/2026	9:00	9:45	p06 Parasitic fish diseases II	8E-1, 8E-2, 8E-3		0:45	Gjurčević E.	P_ribe i pčele
22/04/2026	8:15	9:45	v07 External examination and biopsy I	8E-1, 8E-2		1:30	Gjurčević E.	P_ribe i pčele

Activities - Biology and Pathology of Aquatic Organisms (2/2)

Start Date	Start T	End Ti	Course	Group	Note	Length	Instructor	Room
23/04/2026	9:15	10:45	v07 External examination and biopsy I	8E-3		1:30	Gjurčević E.	P_ribe i pčele
27/04/2026	8:15	9:45	v08 External examination and biopsy II	8E-2, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
27/04/2026	11:45	13:15	v08 External examination and biopsy II	8E-1		1:30	Gjurčević E.	P_ribe i pčele
05/05/2026	13:15	14:45	v09 Virological and bacteriological procedures	8E-2		1:30	Gjurčević E.	P_ribe i pčele
14/05/2026	8:15	9:45	v09 Virological and bacteriological procedures	8E-1, 8E-3		1:30	Gjurčević E.	P_ribe i pčele
25/05/2026	9:00	10:30	v10 Ichthyosanitary measures	8E-1, 8E-2, 8E-3, V_ribe i pčele		1:30	Matanović K.	P_ribe i pčele
01/06/2026	9:15	10:15	Biology and Pathology of Aquatic Organisms	8E-1, 8E-2, 8E-3	Kolokvij	1:00	Gjurčević E.	P_ribe i pčele
08/06/2026	8:00	16:00	v11 Field Work - Cyprinid fish farm	8E-3		8:00	Gjurčević E.	
08/06/2026	8:00	16:00	v11 Field Work - Cyprinid fish farm	8E-1, 8E-2		8:00	Gjurčević E.	
11/06/2026	8:00	16:00	v12 Field Work - Trout fish farm	8E-3		8:00	Matanović K.	
11/06/2026	8:00	16:00	v12 Field Work - Trout fish farm	8E-1, 8E-2		8:00	Matanović K.	
12/06/2026	9:00	10:00	Biology and Pathology of Aquatic Organisms	8E-1, 8E-2, 8E-3	Kolokvij	1:00	Gjurčević E.	P_ribe i pčele
Total: 27						**64:45**		

STUDENT OBLIGATIONS

Lecture attendance	Lecture attendance: 3-6 points (1 lecture hour equals 0.54 point).
Practicals attendance	Practicals attendance: 8-12 points (1 practicals hour equals 0.48 point). Student must attend at least 17 hours of practicals to achieve a minimum of 8 points. Note: due to the specificities of the life of the honeybee colony during the active beekeeping season, it is not possible to compensate for the absence from field classes (apiary I and II).
Active participation in practicals	Active participation in practicals: 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.

Course: BIOLOGY AND PATHOLOGY OF BENEFICIAL INSECTS

GRADING AND EVALUATING STUDENT WORK

Continuous knowledge-checking (mid-terms)	Continuous knowledge checking: 1 preliminary written exam (32 points). Student must achieve a minimum of 20 points to pass the exam.
Final exams (dates)	1/7/2026, 10/7/2026, 11/9/2026 and 21/9/2026
Form of final exam	Oral

LITERATURE

Obligatory literature	1. BAILEY, L., B. BALL (1991): Honey bee pathology. Academic Press, London. 2. GARY, N. E. (2005): Activities and behavior of honey bees. In: The hive and the honey bee (Graham, J. M., ed.). Dadant and Sons, Hamilton, USA. 3. SNODGRASS, R. E., E. H. ERIKSON (2005): The anatomy of the honey bee. In: The hive and the honey bee (Graham, J. M., ed.). Dadant and Sons, Hamilton, USA. 4. SOUTHWICK, E. E. (2005): Physiology and social physiology of the honey bee. In: The hive and the honey bee (Graham, J. M., ed.). Dadant and Sons, Hamilton, USA. 5. TLAK GAJGER, I. (2021): Honeybee Diseases in Modern Production. University of Zagreb Faculty of Veterinary Medicine, Zagreb. 6. VIDAL-NAQUET, N. (2015): Honeybee Veterinary Medicine: Apis mellifera L. 5m Publishing Benchmark House, Sheffield, UK.
Optional literature	1. CARON, D. M., L.J. CONNOR (2013): Honey bee biology and beekeeping. Wicwas Press, Pennsylvania, USA. 2. TAUTZ, J. (2008): The buzz about bees – biology of a superorganism. Springer, Germany.

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 - explain manner of life and activities of honeybee colony, construction of combs and development of brood - differentiate the types of hives, feeders, watering containers and beekeeping tools - 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 - manage the procedures of taking and sending samples for laboratory examination, treatment and remediation of honeybee diseases.

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