

Course: BIOLOGY AND PATHOLOGY OF AQUATIC ORGANISMS

UNIVERSITY OF ZAGREB
FACULTY OF VETERINARY MEDICINE
Heinzlova 55
Tel. 01/2390-153
Division: ANIMAL PRODUCTION AND BIOTECHNOLOGY
Organizational unit: BIOLOGY AND PATHOLOGY OF FISH AND BEES
E-mail of the course leader: egjurcevic@vef.unizg.hr
Register No of the organisational unit: 251-61-14/24-5
Zagreb, 24/1/2024



177911	REPUBLIKA HRVATSKA	
Veterinarski fakultet u Zagrebu		
Primljeno:	25.01.2024	
Klasifikacijska oznaka	Org. jed.	
605-03/23-04/28	251-61-32;251-61-41;	
Urudžbeni broj	Prilozi	Vrijednost
251-61-14/359-24-80	0	-

COURSE SYLLABUS

Course name: Biology and Pathology of Aquatic Organisms
Academic year 2023/2024

Course leader: Full Professor Emil Gjurčević

Deputy course leader: Associate Professor Krešimir Matanović

Teachers: Full Professor Emil Gjurčević
Associate Professor Krešimir Matanović
Valerija Benko PhD

First day of classes: 5/3/2024

Last day of classes: 5/6/2024

Activities - Biology and Pathology of Aquatic Organisms (1/2)								
	Start T	End Ti	Subject	Group	Note	Length	Instructor	Room
05/03/2024	13:30	15:00	p01 Water	8E-1, 8E-2, 8E-3		1:30	Matanovic K.	P_ribe i pcele
07/03/2024	7:30	9:00	p02 Natural spawning	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_fizika
11/03/2024	11:00	12:30	p03 Artificial spawning	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
11/03/2024	12:45	14:15	v01 Systematic of freshwater fish	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
14/03/2024	13:00	14:30	v02 Systematic of marine fish and shellfish	8E-1, 8E-2, 8E-3		1:30	Matanovic K.	P_ribe i pcele
15/03/2024	8:30	10:00	p04 Viral fish diseases	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
03/04/2024	16:15	17:45	v03 Fish anatomy I	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
05/04/2024	16:15	17:45	v04 Fish anatomy II	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
12/04/2024	16:15	17:45	v05 Dissection of common carp and rainbow trout	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
15/04/2024	14:30	16:00	v06 Dissection of marine fish and shellfish	8E-1, 8E-2, 8E-3		1:30	Gjurcevic E.	P_ribe i pcele
19/04/2024	16:30	18:00	v07 Post-mortem examination of fish I	8E-1, 8E-2, 8E-3		1:30	Matanovic K.	P_ribe i pcele
30/04/2024	10:00	11:30	p05 Bacterial fish diseases	8E-1, 8E-2, 8E-3		1:30	Matanovic K.	P_ribe i pcele
30/04/2024	12:00	12:45	p06 Parasitic fish diseases	8E-1, 8E-2, 8E-3		0:45	Gjurcevic E.	P_ribe i pcele
07/05/2024	8:30	10:00	v08 Post-mortem examination of fish II	8E-3		1:30	Gjurcevic E.	P_ribe i pcele
08/05/2024	14:30	16:00	v08 Post-mortem examination of fish II	8E-1, 8E-2		1:30	Gjurcevic E.	P_ribe i pcele
13/05/2024	15:00	16:30	v09 Virological and bacteriological procedures	8E-3		1:30	Matanovic K.	P_ribe i pcele

Activities - Biology and Pathology of Aquatic Organisms (2/2)								
	Start T	End Ti	Subject	Group	Note	Length	Instructor	Room
14/05/2024	13:00	14:30	v09 Virological and bacteriological procedures	8E-1, 8E-2		1:30	Matanovic K.	P_ribe i pcele
16/05/2024	16:00	17:30	v10 Collection of samples	8E-1, 8E-2, 8E-3, V_ribe i pcele		1:30	Matanovic K.	P_ribe i pcele
22/05/2024	8:00	17:00	v11 Field Work - Cyprinid fish farm	8E-1, 8E-2		9:00	Gjurcevic E.	
22/05/2024	8:00	17:00	v11 Field Work - Cyprinid fish farm	8E-3		9:00	Gjurcevic E.	
23/05/2024	15:45	16:45	Biology and Pathology of Aquatic Organisms	8E-1, 8E-2, 8E-3	Kolokvij	1:00	Gjurcevic E.	P_ribe i pcele
04/06/2024	16:15	17:15	Biology and Pathology of Aquatic Organisms	8E-1, 8E-2, 8E-3	Kolokvij - 1. ponavljanje	1:00	Gjurcevic E.	P_ribe i pcele
05/06/2024	8:00	17:00	v12 Field Work - Trout fish farm	8E-1, 8E-2		9:00	Matanovic K.	
05/06/2024	8:00	17:00	v12 Field Work - Trout fish farm	8E-3		9:00	Matanovic K.	
Total: 24						64:15		

Timetable for LECTURES academic year 2023/2024

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 (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 the Integrated Undergraduate and Graduate Study of Veterinary Medicine (2022). Given the above, the student must acquire a minimum number of points from all assessment elements in order to take the final exam. Regulations On Intergraduate And Graduate Studies, Article 41: 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 (1 preliminary exam – 20 questions): 20-32 points (1 question equals 1.6 points)
Final exams (dates)	19/3/2024, 22/4/2024, 17/6/2024, 17/7/2024, 9/7/2024, 9/9/2024 and 23/9/2024
Form of final exam	Oral

LITERATURE

Obligatory literature	<ol style="list-style-type: none">1. BARDACH, J. E., J. H. RYTHER, W. O. McLARNEY (1972): Aquaculture: The Farming and Husbandry of Freshwater and Marine Organisms. Wiley-Interscience, New York, London, Sydney, Toronto.2. HOLE, D., D. BUCKE, P. BURGESS, I. WELLBY (2001): Diseases of carp and other cyprinid fishes. Fishing News Books, London.3. NOGA, E. J. (2000): Fish disease: Diagnosis and Treatment. Iowa State University Press, Ames.4. ROBERTS, R. J. (2001): Fish pathology, 3rd ed. W. B. Saunders, London.5. WOO, P. T. K., D. W. BRUNO (1999): Fish Diseases and disorders, Vol. 3.: Viral, bacterial and fungal infections. CABI Publishing, Wallingford.6. PP presentations of lectures and practicals.
Optional literature	<ol style="list-style-type: none">1. BOYD, C. E. (1990): Water Quality in Ponds for Aquaculture. Auburn University, Alabama.2. FERGUSON, H. W. (2006): Systemic pathology of fish: A text and atlas of normal tissues in teleosts and their responses in disease. Scotian Press, London.3. GREENBERG, D. B. (1960): Trout farming. Chilton company – book division, Philadelphia, New York.4. HORVATH, L., G. TAMAS, C. SEAGRAVE (1992): Carp and pond fish culture. Fishing News Book, Oxford.5. PLUMB, J. A. (1999): Health maintenance and principal microbial diseases of cultures fishes. Iowa State University.6. SINDERMANN, C. J. (1990): Principal diseases of marine fish and shellfish. Academic Press, London.

OBJECTIVES AND LEARNING OUTCOMES

Course objectives	During lectures and exercises, students obtain general knowledge about breeding of aquatic organisms in order to comprehend the importance and role of veterinarians in recognising and controlling aquatic organism diseases. The skills which one must accomplish are proper examination of aquatic organisms, recognition of clinical signs, sampling and sending the materials for laboratory procedures, and also prevention and therapy in aquaculture.
Learning outcomes	The course is linked to the basic veterinary courses in previous years of study and represents synthesis of previous veterinary disciplines applicable to the biology and pathology of fish and other aquatic organisms. The course prepares students for laboratory and field work in the field of biology and pathology of fish and other aquatic organisms. Learning outcomes: <ol style="list-style-type: none">1. Recognize fish species and other aquatic organisms important for breeding2. Obtain general knowledge about breeding of aquatic organisms3. Comprehend the importance and role of veterinarians in maintenance of fish health and human health4. Perform routine diagnostic examination, recognize clinical signs of disease5. Professional sampling and transport of samples for laboratory examinations6. Apply therapeutic measures and measures for prevention of disease.

GRADING SCHEME

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

Course leader

U.Š. Matčević

Head of organizational unit:

Matčević

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

Timetable for LECTURES academic year 2023/2024

LECTURES				
Date	Methodological unit	Teacher	Location / Time	Literature
5/3/2024 1 st lecture	Introduction (Importance of breeding of aquatic organisms); The aquatic environment (Basic water quality parameters for aquatic organisms); Natural and artificial spawning; Breeding of aquatic organisms I.	Associate Professor Krešimir Matanović	Laboratory room - Biology and Pathology of Fish and Bees 1.30pm-3pm	Obligatory literature No. 1, 6 Optional literature No. 7, 9, 10
7/3/2024 2 nd lecture	Breeding of aquatic organisms II; Viral fish diseases (Diseases prevented by Regulations of veterinary medicine and others important for breeding).	Full Professor Emil Gjurčević	Laboratory room - Biology and Pathology of Fish and Bees 7.30am-9am	Obligatory literature No. 1 – 6 Optional literature No. 8, 9, 11, 12
11/3/2024 3 rd lecture	Viral fish diseases (Diseases prevented by Regulations of veterinary medicine and others important for breeding).	Full Professor Emil Gjurčević	Laboratory room - Biology and Pathology of Fish and Bees 11am-12.30pm	Obligatory literature No. 1 – 6 Optional literature No. 8, 11, 12
15/3/2024 4 th lecture	Bacterial fish diseases (Diseases important for breeding).	Associate Professor Krešimir Matanović	Laboratory room - Biology and Pathology of Fish and Bees 8.30am-10am	Obligatory literature No. 1 – 6 Optional literature No. 8, 11, 12
30/4/2024 5 th lecture	Parasitic fish diseases (Diseases important for breeding).	Full Professor Emil Gjurčević	Laboratory room - Biology and Pathology of Fish and Bees 10am-11.30am	Obligatory literature No. 1 – 6 Optional literature No. 8, 11, 12
30/4/2024 6 th lecture	Parasitic fish diseases (Diseases important for breeding); Fungal fish diseases and diseases caused by abiotic factors; Diseases of other aquatic organisms (Diseases prevented by Regulations of veterinary medicine).	Full Professor Emil Gjurčević	Laboratory room - Biology and Pathology of Fish and Bees 12pm-12.45pm	Obligatory literature No. 1 – 6 Optional literature No. 8, 11, 12

Timetable for PRACTICALS academic year 2023/2024

PRACTICALS						
Date	Methodological unit	Teacher	Type of practical (Article 31. of Regulation)	Group	Location / time	Literature
11/3/2024 1 st practical	Systematic of freshwater fish	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 12.45pm-2.15pm	Obligatory literature No. 6
14/3/2024 2 nd practical	Systematic of marine fish and shellfish; Shellfish anatomy	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 1pm-2.30pm	Obligatory literature No. 6
3/4/2024 3 rd practical	Fish anatomy I (Integument system, musculoskeletal system, respiratory system)	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4.15pm-5.45pm	Obligatory literature No. 3, 4, 6 Optional literature No. 8
5/4/2024 4 th practical	Fish anatomy II (circulatory system, digestive system, excretory system, nervous and sensory system)	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4.15pm-5.45pm	Obligatory literature No. 3, 4, 6 Optional literature No. 8
12/4/2024 5 th practical	Dissection of common carp and rainbow trout	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Clinical	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4.15pm-5.45pm	Obligatory literature No. 2, 4, 6 Optional literature No. 8
15/4/2024 6 th practical	Dissection of marine fish and shellfish; Diseases of shellfish	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Clinical	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 2.30pm-4pm	Obligatory literature No. 4, 6 Optional literature No. 8

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19/4/2024 7 th practical	Post-mortem examination of fish I (necropsy)	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4.30pm-6pm	Obligatory literature No. 4, 6 Optional literature No. 12
7/5/2024 8 th practical	Post-mortem II examination of fish (necropsy)	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović	Clinical	3	Laboratory room - Biology and Pathology of Fish and Bees 8.30am-10am	Obligatory literature No. 4, 6 Optional literature No. 12
8/5/2024 8 th practical	Post-mortem II examination of fish (necropsy)	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Clinical	1,2	Laboratory room - Biology and Pathology of Fish and Bees 2.30pm-4pm	Obligatory literature No. 4, 6 Optional literature No. 12
13/5/2024 9 th practical	Virological and bacteriological procedures	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović	Clinical	3	Laboratory room - Biology and Pathology of Fish and Bees 3pm-4.30pm	Obligatory literature No. 3, 4, 5, 6
14/5/2024 9 th practical	Virological and bacteriological procedures	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Clinical	1,2	Laboratory room - Biology and Pathology of Fish and Bees 1pm-2.30pm	Obligatory literature No. 3, 4, 5, 6
16/5/2024 10 th practical	Collection of samples for laboratory examinations; Diseases prevention and treatment	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović Valerija Benko, DVM, PhD	Laboratory	1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4pm-5.30pm	Obligatory literature No. 3, 4, 6 Optional literature No. 11
22/5/2024 11 th practical	Breeding of warmwater fish	Full Professor Emil Gjurčević Associate Professor Krešimir Matanović	Clinical	1,2,3	Cyprinid fish farm 8am-4pm	Obligatory literature No. 1, 6 Optional literature No. 7, 10
23/5/2024	COLLOQUIUM			1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 3.45pm-4.45pm	
5/6/2024 12 th practical	Breeding of salmonid fish	Full Professor Emil Gjurčević	Clinical	1,2,3	Trout fish farm 8am-4pm	Obligatory literature No. 1, 6

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		Associate Professor Krešimir Matanović				Optional literature No. 7, 9
4/6/2024	COLLOQUIUM Repeated			1,2,3	Laboratory room - Biology and Pathology of Fish and Bees 4.15pm-5.15pm	