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**MINISTRY OF EDUCATION, CULTURE, RESEARCH AND TECHNOLOGY
UNIVERSITY LAMPUNG**

FACULTY OF TEACHER TRAINING AND EDUCATION

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Bachelor of Biology Education

MODULE HANBOOK

Module designation	Invertebrate Zoology/KB0620202
Semester(s) in which the module is taught	3 rd
Person responsible for the module	1. Dr. Dewi Lengkana 2. Berti Yolida, S.Pd, M.Pd. 3. Ismi Rakhmawati, S.Pd, M.Pd.
Language	Bilingual (English and Bahasa)
Relation to curriculum	Compulsory
Teaching methods	Lectures (100 minutes) Practicum sessions (170 minutes)
Workload (incl. contact hours, self-study hours)	Contact hours: 14 weeks x 100 minutes Structured learning: 14 weeks x 120 minutes Independent study: 14 weeks x 120 minutes Practicum sessions: 14 weeks x 170 minutes
Credit points	3(2-1) CP or 4.77 (ECTS) ((14 weeks x 100 minutes) + (14 weeks x 120 minutes) + (14 weeks x 120 minutes) + (14 weeks x 170 minutes)) : 60 minutes/hour = 119 hours : 25 study hours/ECTS = 4.77 (ECTS)
Required and recommended prerequisites for joining the module	Basic biology
Module objectives/intended learning outcomes	students can understand about the diversity of invertebrate animals which includes: evolution, taxonomy, morphology, physiology, ecology and economic value as well as its benefits in accordance with the development of science, technology, and science

Content	Animal structure is a 3(2-1) credit course. The course discusses the diversity of invertebrate animals that include: evolution, taxonomy, morphology, physiology, ecology and economic value as well as its benefits in accordance with the development of science, technology, and science.
Examination forms	essay
Study and examination requirements	Participants are evaluated based on their performance in class (lectures) (75%) and (practice) (25%). Performance in theory (100%): ● Mid Exam (30%) ● Final Exam (30%) ● Class Participations (20%) ● Assignment (20%) Performance in practice (100%): ● Practicum exam (30%) ● Pre-test or post-test (10%) ● Experiment reports (40%) ● Laboratory Skills (20%)
Reading list	1. Rakhmawati, Lengkana, Maulina, Yolida. (2018). Zoologi Invertebrata. Aura. Lampung. 2. Brusca, Moore, Shuster. (2003). Invertebrate. Oxford: Oxford University 3. Campbell, Reece, and Mitchell. (2010). Biologi. Erlangga. Jakarta 4. Hickman and Larry S Roberts, Allan Larson. (1993). Integrated Principles of Zoology. Ninth Edition. Mosby, St Louis, Sydney Toronto. 5. Johnson, R. (2004). Biology. John Wiley & Sons. New York. 6. Kimball, J. W. (1991). Biologi. Erlangga. Jakarta. 7. Radioputro. (1996). Zoologi. Erlangga. Jakarta.

The final score then converted into the grade as follows:

Final score	Conversion	
	Grade	Points
86 – 100	A	4.00
81 – 85	A-	3.67
76 – 80	B+	3.33
71 – 75	B	3.00
66 – 70	B-	2.67
61 – 65	C+	3.33
56 – 60	C	2.00
41 – 55	D	1.00
0 – 40	E	0.00

For passing this course, students must obtain grade C or higher.



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Group :

Day/ Date :

Material :

Aspects / Categories / Criteria	4	3	2	1
Contents text	Solid content will information, clear (readability/form)	Two from criteria good content / text fulfilled, while Wrong One criteria No filled	Only Wrong One from criteria good content / text fulfilled, while two criteria No filled	Text content too long, poor information, no clear its readability (entire criteria No fulfilled)
Design	Color interesting, size element compiler proportional, the message you want to convey delivered become center attention (third) criteria fulfilled	Two from criteria good design fulfilled, while Wrong One criteria No filled	Only Wrong One from criteria good design fulfilled, while two criteria No filled	Color, size element compiler, center attention No show good design (all criteria No fulfilled)
Image Shape	Picture interesting, meaningful as the transmitter message, and original (third) criteria fulfilled	Two from criteria good picture fulfilled, while Wrong One criteria	Only Wrong One from criteria good picture fulfilled, while two criteria	Picture No interesting, no meaningful as the transmitter message, and No original (entire)

		No filled	No filled	criteria good design No fulfilled)
Deliverability Message	Message very easy arrested reader	Message Enough easy arrested reader	Message difficult arrested reader	Message No can arrested reader



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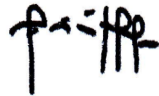
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Group :

Day/ Date :

Material :

No	Component Evaluation	Score Max	Student Name And Evaluation			
1	Mastery Material	20				
2	Ability answer question And to argue a. Polite language b. Ability control self c. Supported by relevant references	30				
3	Open and value other people's opinions	10				
4	Appearance group a. Attitude And discipline b. Not quite enough answer / cooperation c. Communication d. Appearance neat And polite	30				
5	Mastery of presentation media	10				
Amount Score Maximum		100				

		UNIVERSITY OF LAMPUNG FACULTY OF TEACHER TRAINING AND EDUCATION DEPARTMENT OF MATHEMATICS AND NATURAL SCIENCES BIOLOGY EDUCATION STUDY PROGRAM				
Course Code: KBO620202		SEMESTER LESSON PLAN (RPS)			Date of Preparation 1 Juli 2022	
Course Name : Invertebrate Zoology		Study Program: Pendidikan Biologi			Credit SKS: 3 (2-1)	
Autorisation		RPS Developer Coordinator Name  Dr. Dewi Lengkana, M.Sc. S.Pd., M.Pd.  Dr. Berti Yolida,			Head of study program  Rini Rita T Marpaung, M.Pd.	
Semester: 4		Responsible lecturer: Dr. Dewi Lengkana, M.Sc.				
Graduate Learning Outcomes (CPL)		- Demonstrating scientific, educational, and religious attitudes and behaviors that contribute to the improvement of the quality of community life, nationhood, and statehood based on culture, norms, and academic ethics - Integrating skills and innovating technology and information mastery, career development, and life skills to become lifelong learning. - Applying logical, critical, systematic, and innovative thinking in the context of developing/implementing science and technology that pays attention to and applies communication of humanistic values relevant to their field of expertise. - Mastering concepts, principles, theories, laws, and biological processes to solve problems in biology education.				
Course Learning Outcomes (CPMK)		- Explaining the relationships between the structure, morphology, physiology, behavior, and ecology of animals starting from the class Protozoa, Porifera, Ctenozoa, Mollusca, Pheretima, Insecta, and Echinodermata. - Skillfully using Biology applications (animations) to explain physiological concepts in invertebrate animals. - Communicating the understanding of concepts gained through observations of invertebrate animal objects.				
Course Description		The course on Invertebrate Zoology discusses the biology of animals without a backbone. The discussion starts with terms, concepts, basic principles, laws, and theories that underpin the relationships between structure, anatomy, morphology, function, physiology, ecology, and the development of invertebrate animals in each of their respective phyla: the phylum Protozoa, Porifera, Scyphozoa, Mollusca, Platyhelminthes, Annelida, Insecta, and Echinodermata. Students are also trained on how to teach this material by analyzing strategies, models, and teaching methods.				
Ming-g u ke ...	Expected abilities (sub CPMK)	Study materials/learning materials	Forms, learning methods, and learning experiences	Time (minutes)	Assessment	
					Technique	Indicator

1	Understanding the terms, basic concepts of animal classification, morphology and anatomy as well as the physiology of Protozoa.	1. Latin terms in the context of zoology, 2. Principles of animal classification (Whittaker) 3. Morphology, anatomy, physiology of Protozoa animals.	• Face to face • Structured tasks • Independent tasks	50 60	• Q&A • Discussion	1. Explaining the meaning of terms in the context of invertebrate zoology. 2. Explaining the principles of classification.	5
2	Understanding the relationship between the structure and physiology as well as the ecology of Protozoa animals.	1. Observing the structure and morphology of protozoan animals 2. Analyzing the physiology of protozoan animals	• Face to face • Structured tasks	60 100	Inquiry	1. Explaining the structure and morphology 2. Analyzing physiology	
3	Understanding the general characteristics, morphology, anatomy and ecology as well as physiology and development of animals in the phylum Porifera.	1. Observing general characteristics, morphology, and 2. Analyzing anatomy and ecology 3. Analyzing the physiology of animals in the phylum Porifera	• Face to face • Presentation • FGD	60 100	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
4	Understanding the general characteristics, morphology, anatomy, ecology, as well as the physiology and development of animals and their role in the ecosystem of animals that belong to the phylum Cnidaria.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Cnidaria animals	• Face to face • Structured tasks • Independent tasks	60 60 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
5	Understanding the general characteristics, morphology, anatomy, ecology, as well as the physiology and development of animals and their role in the ecosystem of animals that belong to the phylum Cnidaria.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Cnidaria animals	• Face to face • Presentation • FGD	50 60 50	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
6	Kuis 1		Written test	60	Essay test		10
	Understanding the general characteristics, morphology, anatomy,	1. Observing general characteristics, morphology and anatomy	• Face to face • Presentation • FGD	50 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology	5%

	and ecology as well as the physiology and development of animals and their roles in the animal ecosystem that belong to the phylum Platyhelminthes.	2. Analyzing physiology and ecology 3. Analyzing the role of Platyhelminthes animals		50		3. Analyzing anatomy and ecology	
7	Understanding the general characteristics, morphology and anatomy, physiology, ecology, and analysis of the role of Mollusca animals.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Mollusca	• Face to face • Presentation • FGD		Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	5%
8	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as analyzing the role of Annelida animals.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Annelida	• Face to face • Presentation • FGD	60 50 50	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	5%
9	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as analyzing the role of Arthropoda animals.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Arthropoda	• Face to face • Presentation • FGD	50 60 50	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	5%
10	Memahami Ciri umum, morfologi, anatomi, Fisiologi dan ekologi serta Analisis peran hewan Insecta	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Insecta	• Face to face • Presentation • FGD	50 60 50	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
11	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as analyzing the role of Crustacea animals.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Crustacea	• Face to face • Presentation • FGD	50 50 50	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	5%

12	Kuis 2		Face to face	60			10%
	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as the analysis of the roles of Myriapoda and Decapoda animals.	1. Observing general characteristics, morphology and anatomy 2. Analyzing physiology and ecology 3. Analyzing the role of Myriapoda and Decapoda	• Face to face • Presentation • FGD	60 60 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	5%
13	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as the analysis of the role of Echinodermata animals.	1. Observing general characteristics, morphology, and anatomy 2. Physiology and ecology 3. Analysis of the role of animals Echinodermata	• Face to face • Presentation • FGD	60 60 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
14	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as the analysis of the role of Echinodermata animals.	1. Observing general characteristics, morphology, and anatomy 2. Physiology and ecology 3. Analysis of the role of animals Echinodermata	• Face to face • Presentation • FGD	60 60 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
15	Understanding the general characteristics, morphology, anatomy, physiology, and ecology as well as the analysis of the role of Echinodermata animals.	1. Observing general characteristics, morphology, and anatomy 2. Physiology and ecology 3. Analysis of the role of animals Echinodermata	• Face to face • Presentation • FGD	60 60 60	Inquiry	1. Explaining general characteristics 2. Analyzing anatomy and physiology 3. Analyzing anatomy and ecology	
16	FINAL EXAM		Face to face	70	Essay test		10%



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MID-SEMESTER EXAM QUESTION (UTS) ON INVERTEBRATE ZOOLOGY
ACADEMIC YEAR 2024/2025

Read each statement carefully. Determine whether it is true or false.

Choose and circle the letter 'B' if the statement is true. Choose and circle the letter 'S' if the statement is false. Make sure there is only one answer for each question.

1. Invertebrates include all animals except vertebrate animals. **(B/S)**
2. Generally, protozoa exhibit polymorphism, which means different forms at various stages in their life cycle. **(B/S)**
3. The bloom of dinoflagellates is the cause of 'red tide,' which is toxic. **(B/S)**
4. Plasmodium falciparum causes quartan malaria. **(B/S)**
5. Nutrients in porifera are distributed throughout the body by diffusion and osmosis by amoebocytes. **(B/S)**
6. Ovum and spermatozoa develop from amoebocyte cells called archaeocytes. **(B/S)**
7. Porifera is a phylum whose members all live in the sea. **(B/S)**
8. Coelenterata immobilize their prey using tentacles that contain cnidocyte cells. **(B/S)**
9. The digestive process in Hydrozoa begins with capturing food using nematocyst tentacles, swallowing it into the gastrovascular cavity, digesting it with trypsin, nutrients being absorbed by the epithelial muscle, distributed by diffusion, with waste expelled through the anus. **(B/S)**
10. Anthozoa have both polyp and medusa phases. **(B/S)**
11. The digestive system of Platyhelminthes consists of the mouth, pharynx, and intestine. **(B/S)**
12. Turbellaria and Trematoda are members of Platyhelminthes that live as parasites. **(B/S)**
13. Turbellaria are scavengers, also referred to as carnivores. **(B/S)**
14. Leftover food from Planaria is discharged into the intestine - flame cells. **(B/S)**
15. Planaria has eye spots made up of pigment cells that are sensitive to light and are photopositive. **(B/S)**
16. The life cycle of Fasciola hepatica consists of: Zygote - Myrasidium Larva - Sporocyst - Redia - Metacercaria - Cercaria - Adult Worm. **(B/S)**
17. The class Trematoda has a long flat body consisting of a head (scolex) equipped with hooks and suckers, useful for attaching to the intestine of the host. **(B/S)**
18. Proglottids in Cestoda are located at the far end, containing mature eggs that are ready to be expelled from the host along with feces to infect again. **(B/S)**
19. Plasmodium sp: the cause of malaria is transmitted by Anopheles mosquitoes. **(B/S)**
20. Mastigophora is characterized by: Unicellular, fixed body shape without an outer skeleton, body protected by pellicle, and locomotion by flagella. **(B/S)**



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FINAL EXAM QUESTION (UAS) ON INVERTEBRATE ZOOLOGY

ACADEMIC YEAR 2024/2025

Read each statement carefully. Determine whether it is true or false.

Choose and circle the letter 'B' if the statement is true. Choose and circle the letter 'S' if the statement is false. Make sure there is only one answer for each question.

1. Chelicerata includes rare arthropods. **(B/S)**
2. Recycling water and potassium helps spiders adapt in dry environments by conserving body fluids, with urine and feces tending to be dry. **(B/S)**
3. Chilopoda has 177 body segments and each segment has 2 pairs of legs. **(B/S)**
4. The Enterobius vermicularis worm has a life cycle where males fertilize females inside the human body. **(B/S)**
5. The Enterobius vermicularis worm lays its eggs in the anal area of the infected human. **(B/S)**
6. The Ascaris Lumbricoides worm plays a role in decomposition in the human intestine. **(B/S)**
7. Filarial worms infect humans through the bite of Culex mosquitoes that bite sufferers. **(B/S)**
8. Echinodermata do not have a brain but possess a ladder-like nerve cord. 9. The Redia cycle of liver flukes occurs in the host snail. **(B/S)**
10. Cercaria of liver flukes attaches to plants. **(B/S)**
11. The scolex of the tapeworm is used to release mature eggs. **(B/S)**
12. The proglottid of the tapeworm is equipped with hooks and suckers. **(B/S)**
13. Nematyhelminthes has a pseudocoelom. **(B/S)**
14. Nematyhelminthes already has an anus in its digestive system. **(B/S)**
15. Ascaris lumbricoides becomes a parasite in the human abdomen. **(B/S)**
16. Ascaris worms are characterized by a more pointed and longer body compared to females. **(B/S)**
17. Ancylostoma duodenale is a parasite that absorbs blood and body fluids. **(B/S)**
18. Enterobius vermicularis lives in the human anus. **(B/S)**
19. Enterobius worms lay their eggs around the human anus. **(B/S)**
20. Ancylostoma braziliense worms lay their eggs around the human anus. **(B/S)**
21. Filarial worms infect humans through intermediaries of all mosquitoes. **(B/S)**
22. Annelida includes animals that have metamerism. **(B/S)**
23. Respiration in Annelida occurs through the skin surface. **(B/S)**

24. *Lumbricus terrestris* has setae on each of its segments. **(B/S)**
25. *Hirudo medicinalis* is an animal that does not have setae. **(B/S)**
26. The clitellum on earthworms is lighter in color compared to the rest of the body. **(B/S)**
27. The clitellum is found on body segments 31 to 37. **(B/S)**
28. Mollusks have an open respiratory system. **(B/S)**
29. Gastropods move using their foot located on the head. **(B/S)**
30. Bivalves have many species, among them *Chiton*. **(B/S)**
31. *Nautilus* is not classified with other types of snails due to differences in movement. **(B/S)**
32. Polyplacophora and bivalves share similarities, namely reduced heads and body parts that function for movement. **(B/S)**
33. Slugs are classified in gastropods. **(B/S)**
34. All members of Cephalopoda have an internal shell. **(B/S)**
35. Snails have blue blood. 36. Slugs live terrestrially. **(B/S)**
37. Cuttlefish eyes are similar to eyes in vertebrates. **(B/S)**
38. All members of mollusks have chromatophores. **(B/S)**
39. Cephalopoda have hectocotylus to assist in swimming. **(B/S)**
40. Sea worms harvested during the bau nyale tradition in NTB are classified as oligochaeta. **(B/S)**
41. Most annelids that inhabit the sea include polychaeta. **(B/S)**
42. The number of legs in insects is 6. **(B/S)**
43. The number of legs in Arachnida is 5 pairs. **(B/S)**
44. The number of legs in Crustacea is 8 pairs. **(B/S)**
45. Spiders use book lungs or tracheae or both. **(B/S)**
46. Myriapoda has 2 pairs of legs in each body segment. **(B/S)**
47. Ants, bees, and wasps belong to the order Hymenoptera. **(B/S)**
48. A small portion of Echinodermata live in freshwater. **(B/S)**
49. Echinodermata are classified as triploblastic. **(B/S)**
50. The arms of Asteroidea consist of 4 or more arms. **(B/S)**
51. The arms of Ophiuroidea are tube feet that suck. **(B/S)**
52. The tube feet around the mouth in Holothuroidea develop into tentacles for feeding. **(B/S)**
53. The order Crinoidea is the only member of Echinodermata that resembles plants. **(B/S)**

**KEY ANSWER MID-SEMESTER EXAM QUESTION (UTS) ON INVERTEBRATE
ZOOLOGY ACADEMIC YEAR 2024/2025**

1.	True	11.	False
2.	True	12.	False
3.	True	13.	False
4.	False	14.	True
5.	True	15.	False
6.	True	16.	False
7.	False	17.	False
8.	True	18.	True
9.	False	19.	True
10.	False	20.	True

**KEY ANSWER FINAL EXAM QUESTION (UAS) ON INVERTEBRATE ZOOLOGY
ACADEMIC YEAR 2024/2025**

1.	True	11.	False	21.	False	31.	True	41.	True	51.	False
2.	True	12.	False	22.	True	32.	False	42.	True	52.	True
3.	False	13.	True	23.	True	33.	True	43.	False	53.	True
4.	True	14.	True	24.	False	34.	False	44.	False		
5.	True	15.	True	25.	True	35.	True	45.	True		
6.	False	16.	False	26.	True	36.	True	46.	True		
7.	True	17.	True	27.	False	37.	True	47.	True		
8.	False	18.	False	28.	True	38.	False	48.	False		
9.	True	19.	True	29.	False	39.	False	49.	True		
10.	False	20.	False	30.	False	40.	False	50.	False		

Sample of Students Answer: