Department of Fish Res. And Aquatic Animals

College of Agr. Eng. Scinces

University: Salahaddin University - Erbil

Subject: Aquatic invertebrates

Course Book – (Year 2)

Lecturer's name Assist. Prof. Dr. Samir J. Bilal

Academic Year: 2022/2023

Course Book

1. Course name	**Aquatic Invertebrates**
2. Lecturer in charge	**Samir J. Bilal**
3. Department/ College	**Fish Res./ College of Agr. Eng. Sci.**
4. Contact	**e-mail: Samir.bilal@su.edu.krd** **Tel: (07504663472)**
5. Time (in hours) per week	**Theory: 2** **Practical: 3**
6. Office hours	**Availability of the lecturer to the student during the week**
7. Course code	
8. Teacher's academic profile	Full Name: Assist. Prof. Dr. Samir Jawdat Bilal. No. of Published papers: 32 (including 5 with IMPACT FACTOR, and describing of three new species on science "Biological patient", naming of a nematode in name of Kurdistan, Rhabdocona kurdistanensis). - Edit. Board member in 6 scientific journals.
9. Keywords	**Aquatic, Invertebrates, 2nd year, students.**

10. Course overview:

The Invertebrates are the most diverse and important group of animals on land. Invertebrates are members of a larger group called arthropods (which also includes arachnids, myriapods, and crustaceans). Despite their small size, the here **numbers** or biomass of invertebrates means that they have a significant impact on the environment and therefore upon our lives.Invertebrates are everywhere. They are, by far, the most common animals on our planet. More than 1.5 million species of invertebrates have been named. This is three times the number of all other animals combined. Even so, some say that the invertebrates that have been given names are only a small fraction of the invertebrates in nature. Many are yet to be discovered.We can find invertebrates in almost every conceivable habitat. Their size, shape, color, biology, and life history are so diverse that it makes the study of invertebrates absolutely fascinating. Without invertebrates, our lives would be vastly different. Invertebrates pollinate many of our fruits, flowers, and vegetables. We would not have much of the produce that we enjoy and rely on without the pollinating services of invertebrates, not to mention honey, beeswax, silk, and other useful products that invertebrates provide. Invertebrates feed on a seemingly endless array of foods. Many invertebrates are omnivorous, meaning that they can eat a variety of foods including plants, fungi, dead animals, decaying organic matter, and nearly anything they encounter in their

environment. Still others are specialists in their diet, which means they may rely only on one particular plant or even one specific part of one particular plant to survive.

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11. Course objective:

The importance of studying of invertebrates.

I. Obtain general information about invertebrates and their different groups.
II. Explain the traits of invertebrate's body structures variability.
III. Identify the genera of different families and make a difference between them according
to specific keys.
IV. Describe the properties and studying of their life cycle.
V. Diagnose the different types of invertebrate's adaptations which found in our country.

- VI. Distinguishing of Phylogeny and evolution of these creators.

12. Student's obligation

Students must attend at the lectures.
- At the beginning of each lecture, students may do a quiz about last lecture.
- At the end of each lecture, one or two question/s about the present lecture will be ask as a
feedback for the present lecture.
- For the next lecture, a small homework will be ask and students must bring their own answers.
- Each student do an individual assignment during the semester as a presentation for 10 min. about
a report prepared by the student.
- Groups of 5 students will be responsible for performing assignments that be arrange about the
course.
- Passing grades in mid-term exam as well as quizzes.

13. Forms of teaching

Different forms of teaching will be applied to reach the objectives of the course:

1- White board and Data show using.
2- Group teaching as a team work for preparing of samples in the lab.
3- Conversation with students by asking direct questions.
4- Class discussion by the teacher.
5- Demonstration of the lesion by teacher and students conversation.
6- Reading assignments in supplementary sources (Books, Journals and Academic sites).
7- Preparing of Diaries for each concept in the course.
8- Class Projects as individual assignment.

9- Report preparing about selected concepts in invertebrates.

14. Assessment scheme

-Reports.
- Seminars.
- Presentations.

15. Student learning outcome:

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After this term students should be able to...

I. Student's knowledge about invertebrates and their different groups, they be able to draw the evolutionary tree on invertebrate groups.
II. Knowing of various living styles of invertebrates.
III. III. Apply using of keys of different families and make a difference between them to analyse
IV. their characters for detection of the species.
V. IV. Performing practical testes for invertebrates in our ecosystem.
VI. V. Evaluate the different biological adaptions of these organisms.
VII. VI. Diagnose the different types of invertebrate's adaptations which found in our country.
VIII. VII. Detection of most important biotic and abiotic factors that affecting these organisms.
IX. VIII. Categorizing of unicellular and multicellular invertebrates as well as aquatic and terrestrial
X. ones.
XI. IX. Recognizing of the phylogenetic pathways of each invertebrate group.
XII. X. Designing of simple ecosystems for performing practical studies on invertebrates.

16. Course Reading List and References:

1- BALON, E. K.; NOAKES, D.L.; DANZMANN, G. R. & RUSH-SMYTH, M.T. 2016.
Introduction to invertebrates. 2016. Editor: marie Thérèse Rush-Smyth. Department of Integrative
Biology, College of Biological Science, University of Guelph, Guelph, Ontario, Canada.
2. PAUL, J. B.; HART, M. & JOHN, D. R. (2002). Handbook of Fish Biology and Fisheries, FISH
BIOLOGY. Blackwell Publ., 413pp.
4. BARTON, M. 2007. Bond's Biology of Fishes, 3rd edition. Brooks/Cole.
5. BOND, C. 1996. Biology of Invertebrates, 2nd ed. Saunders College Publishing, Orlando, FL.
6. BONE, Q.; MARSHALL, N. B. & BLAXTER, J.H.S. 1995. Biology of invertebrates, 2nd Ed.
Blackie Academic and Professional, Glasgow (Chapman and Hall, New York).
Useful internet references

a. http://lss.at.ufl.edu
b. virginias@usca.edu
c. https://www.uoguelph.ca/registrar/calendars/undergraduate/current/index.shtml
d. https://www.google.com/search?q=invertebrates+classification&oq=invertebrates+&aqs=chrome.3.69i57j0i67j0l8.6715j0j7&sourceid=chrome&ie=UTF-8 .
https://www.animalwised.com/classification-of-invertebrates-chart-with-definitions-andexamples-3657.html

17. The Topics:	**Lecturer's name**
Definition of invertebrates, History, present invertebrates phyla, general characteristics of invertebrate. Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 3. Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 4. Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction 5 1 st Exam 6 Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 7 Sponges Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 8 Coelenterata: Hydra Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 9 Coelenterata: Obelia Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 10 Coelenterata: Aurelia Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 11 Platyhelminthes: Dugesia Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. Annelida: Earthworm (Oligocheata) Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 17 Annelida: Hirudinea Systematic position, habit and habitat, structure, locomotion, feeding (nutrition),	Lecturer's name ex: (2 hrs) ex:

respiration, excretion and reproduction. 18 Arthropoda: Crustacea Crustacea: Cladocera (Water-Fleas) Habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 19 Crustacea: Copepoda Habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 20 Crustacea: Ostracoda Habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction. 21 Chirocepalus sp. (Fairy Shrimps) Systematic position, habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction 22 Mollusca: Gastropoda Systematic position, Habit and habitat, structure, locomotion, feeding (nutrition), respiration, excretion and reproduction.	
18. Practical Topics (If there is any)	
In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includeS a brief description of the objectives of each topic, date and time of the lecture	Lecturer's name ex: (3-4 hrs) ex: 14/10/2015

19. Examinations:

1. Compositional: Example/ What are the main groups of invertebrates?

2. True or false type of exams:

Ex: All cestodes are true parasitic.

3. Multiple choices:

Ex/ It can produce infection directly from host to host.

A-Nematoda B-Cestoda C-Entamoeba D-Ascaris.

4. Fill the gaps with the convenient worde?

Cyst is a Stage have a role in …….. and ……

5. Drawing of cycles and illustrations/

Ex: Show in an illustration the effects of Biotic factors on protozoa.

6. Labeling of the body parts on figures and drawings of invertebrate animals.

2. True or false type of exams:

In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided

3. Multiple choices:

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided.

20. Extra notes:

Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.

21. Peer review پێداچوونەوەی هاوەڵ

This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.

(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).

ئەم کۆرسبووکە دەبێت لەلایەن هاوەڵێکی ئەکادیمیەوە سەیر بکرێت و ناوەرۆکی بابەتەکانی کۆرسەکە پەسەند بکات و جەند ووشەیەک بنووسێت لەسەر شیاوی ناوەرۆکی کۆرسەکە و واژووی لەسەر بکات.

هاوەڵ ئەو کەسەیە کە زانیاری هەبێت لەسەر کۆرسەکە و دەبیت پلەی زانستی لە مامۆستا کەمتر نەبێت.