Ministry of Higher Education and Scientific research

Department of Biology
College of education
Salahaddin University-Erbil
Subject: invertebrate (Practic)(6hr/week)
Course Book-(Year:2)
Lecturer's Name:Ass.Lecturer Jwan Dilshad Tawfiq
Academic Year: 2021/2022

the classification orders are: (King—cm, p?røum, czss, order, family, genus, and species)
And also there are (super and sub) in between the orders.
The invertebrates range from the simplest (phylum: Protozoa) to the most complicated (phylum: Echinodermata). Also in the course we will take examples of each classified order, after that we study the characteristics, morphology, habitat, Anatomy : (Structures and their functions), Nutrition, Respiration, Execration, Reproduction, life cycle, Visual aids that give information of life cycle if possible, we also take samples, and study their behaviours, movements, and their importance and roles in life for example: some of them cause diseases some have economic importance, and some will transport causes of disease.
This does not only provide the student with detailed instructions, lucid descriptions and elaborate drawings of the sample he/she examines, thus helping him/her to make perfect dissections and proper scientific drawing , but also aids them to identify the organisms and their role in the pyramid cf life.

11. Course objective:

This course is aiming to achieve several gca:s cr Objectives which are :-
I-TO learn how to identii/ the invertebrate organisms their characteristics and it provides a guide helping the students to identifiy and review the concepts of invertebrate orge nism science. 2-To know how to draw the shape of the invertebrate organism and label its body parts and organs and their functions.
3-To develop critical thinking skills by reviewing journal articles, references , and survey information on invertebrates and by doing experiments and examining samples in the lab for preparing reports. 4-To give general information and principles through the study of structure and functions of each

Course Book

1. Course name	Practical Invertebrate (lab)
2. Lecturer in charge	Mrs Jwan Dilshad Tofiq
3. Department/ College	Biology Dept./ College of Education
4. Contact	e-mail: jwan.tawfiq@su.edu.krd
5. Time (in hours) per week	Practical:12h / 2 for each group
6. Office hours	6

7. Course code	
8. Teacher's academic profile	I graduated in Salahaddin University from college of Education in Biology Department in 1988, my Msc degree was in Salahaddin University college of science/Biology Department in microbiology (ISOLATION AND IDENTIFICATION OF Staphylococcus aureus FROM FOOD AND FOODHANDLERS IN HOSPITALS OF ARBIL CITY)
9. Keywords	

10. Course overview:

Practical invertebrate course is a study of the taxonomy and classification of invertebrate animals. Preserved animals will be utilized for learning the taxonomic relationships bet'.veen various marine invertebrates. Laboratory periods will be used to study scr-e dehavtoural and anatomical characteristics CF selected

type of invertebrate organisms.
The main objective is to gain knowledge and understanding of the invertebrate organisms and their lifecycle, Anatomy (structures and organs and their functions), behaviour, habitat, nutrition, reproduction, movement, and their roles and functions in life and relations which helps the students for their researches.

12. Student's obligation

Every student which is a member of academic community has the right to participate in lab discussions and express their knowledge and they should be treated with respect and dignity and their ideas should be taken with respect by helping them to get the correct information in the right way, every student has the right to learn but alongside the rights they also have responsibilities such as class attendance and they should attend every class and they should prepare their homework before coming to class and study for the tests ,examinations, and lab reports.

13. Forms of teaching

Several type of teaching will be used:

1. Giving an abstract of the former lab lecture with daily/weekly quizzes.
2. Teacher notes including all information on the studied invertebrate and also labelled morphological and life cycle line diagrams on the board.
3. Power point lectures to:
    a. Acquiring information on invertebrate's morphology and structure...
    b. To get best knowledge on the invertebrate life cycle and their habitat.
4. Classroom discussion will done about the studied invertebrate including structure, morphology, habitat, life cycle, information about the methods of invertebrate diagnosis,

14. Assessment scheme

Every student must have two examinations (each on 5 marks), one at the mid of the semester, and the other before the end, Question will come in this form :

Definitions, short answer, comparison, Labelling, Identifying Slides and samples, Drawing structures, Classifications, characteristics, and functions of structures. The weekly quizzes with presence of student activity in laboratory also taken into account by (3 marks) for all. As well as the final exam of the course will be on 20 marks.

(Mean of two examinations) + (weekly quizzes+ activity) ¯ 13%

Final examination: 20%

Final Grade of the student: 33%

15. Student learning outcome:

*Understand the Characteristics of invertebrates

*Understand and being able to describe life system of invertebrates and their relationships with other organisms and its environment

*Be aware of the role of Invertebrates and their benefits and harms

*Knowing how to write reports on invertebrates

*Knowing the role of the invertebrates as food chain

*Knowing the organelle functions at cellular level of cell

*Demonstrate understanding of growth of Invertebrates

*Knowing relationships between invertebrates and other vertebrate organisms

*Knowing about the stages of the invertebrate life cycles and their mode of nutrition and habitat of each stage

*Knowing the types of invertebrates which play role in economic level

*Knowing the types of invertebrates which play role in industrial level

*Knowing how to draw Scientific Drawing and labeling with description

*To know how to express their ideas and discuss the ideas

*To know how to use lab devices (tools) like microscopes, slides, lenses , ...etc *To know how to do critical thinking .

16. Course Reading List and References:

1- Keith, D. E. (2006). Invertebrate Zoology Laboratory Manual, Tarleton State University, Biological Sciences, 60 p.

2- Hickman ,C.P. ; Hickman, F.M. and Kats ,L. (1997). Laboratory Studies in Integrated Principles of Zoology . 9th edition .Mc Graw-Hill Companies .1NC .New York.

3- Hickman,C.P. and Larson, A. (1998). Integrated Principles of Zoology. 11 edition. Mc Graw-Hill Companies .1NC .New York.

4- Ruppert, E. E., R. S. Fox, and R. D. Barnes (2004). Invertebrate Zoology, 7th ed., Thompson Brooks/Cole Publ.

5- www.google.com

17. The Topics:

Course programme

Week 1: introduction to invertebrate

Week 2: Phylum: Sarcomastigophora

I. Super class: Sarcodina (Rhizopoda)

Class:Rhizopodea Ex:

Amoeba sp.

Entamoeba histolytica
Entamoeba coli

2. Superclass: Mastigophora
   1. Class: Zoomastigophora
      Trypanosoma brucei gambiense
      Trypanosoma brucei rhodesiense
      Trypanosoma cruzi
   2. Class: Phytomastigophorea
      Ex: Euglena sp.

Phylum: Sporozoa (Apicomplexa)
ex: Plasmodium sp.

Week 3: Phylum: Ciliophora Paramecium sp.
Vorticella sp.

Balantidium coli Opalina sp.

Week4: Phylum:Porifera

Leucosolenia sp.
Sycon sp.
Euspongia sp.

Week 5: Phylum: Cnidaria (Coelentrata)

1. Class Hydrozoa Ex:

Hydra sp

Week 6: Obelia sp.

2. Class : Scyphozoa(Scyphomedusae) Aurelia aurita Week 7:

3. Class: Actinozoa

A.Order: Alcyonaria (Octoradiata); Alcyonium sp.:

B. Order: Zoantharia (Hexaradiata) Metridium sp.

Stony corals
Family: faviidae Favia
sp.
Family: Pocilloporidae
Stylophora sp.
Family: Meandrinidae
Eusmilia sp.

Week 8: Phylum: platyhelminthes

1/Class: Turbellaria

Planaria sp.

Week 9: Phylum: Platyhelminthes

2/class: Trematode example;

Fasciola hepatica; Schistosoma sp.; Fasciolopsis buski; and Paragonimus westermani.

Week 10: Phylum: Platyhelminthes

3/ Class: Cestoda, example; Taenia saginata; Taenia solium

Week 11: Phylum: Nemathelminthes

1. Order: Ascaridida, example; Ascaris lumbricoides (Abdomen ke)
2. Order: Oxyurida, example; Enterobius vermicularis (Pinworm)

Week 12: Phylum: Annelida (segmented worm)

1. Class: polychaeta
   Nereis virens

2. Class: Oligochaeta
   Lumbricus terrestris

3. Class : Hirudinea
   Hirudo medicinalis

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Week13: Phylum: Arthropoda

1. Class: Crustacea, example; Crayfish, Crab, Copepod, Daphnia, and Shrimp

Week14: Phylum: Arthropoda

3. Class: Arachnida, example; Spiders, Scorpion, Mites and Ticks. Limulus sp.

Week15: Phylum: Arthropoda

3. Class: Insect, example; Pediculus humanus, Locust
4. Class: Chilopoda, example; Scolopendra sp.
5. Class: Diplopoda, example; Julus sp.

Week16: Phylum:M011usca

1. Class: Amphineura, example; Chiton sp.
2. Class: Scaphopoda, example; Dentalium entale
3. Class: Gastropoda, example; snail, slugs, whelks, conch

Week17: Phylum:Mollusca

4. Class: Cephalopoda, example; squids, cuttlefishes, octopods, nautili
5. Class: Pelecypoda, example; clams, mussels, oysters, scallops

Week18: Phylum: Echinodermata

1. Class: Asteroidea, example; Asterias sp. (sea star)
2. Class: Ophiuroidea, example; Ophiura sp. (sea serpent)

Week19: Phylum: Echinodermata

3. Class: Echinoidea, example; Arbacia sp. (sea urchin)
4. Class: Holothuroidea, example; Cucumaria sp. (sea cucumber)

Week20: Phylum: Echinodermata

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5. Class: Crinoidea, example; Antedon sp. (sea lily)	
18. Practical Topics (If there is any)	

19. Examinations:

Examination Samples:

QI. Diagnose the given sample / or slide.

Q2. Classify Hydar sp

Q3: Draw and label the following:

1. Pennaria sp.
2. Metridium sp.

Q4: Write the main characteristics of the following:

Aurelia sp.

Vorticella sp.

Q5 what is the name of diseases that are caused by:-

a- Trypanosoma b - Plasmodium

Q6/ where is the habitat of :-

a- Earth warm
b- Octopus c - Ascaris d- Fasciola

Q7/ write the classification of:-

a- Obelia b - Taenia

Q8/ Draw and label (paramecium)

Q9/What are differences between the scolex of taenia solium and taenia saginata?

QI 0/ What are the functions of

a- Chanocytes b- Blastostyle c- Hyrdanth d- Nematoblasts.

20. Extra notes:

21. Peer review پێداچوونەوەی هاوەڵ