Govt. College for Women, Parade Ground, Jammu (An Autonomous College)
NAAC Accredited "A" Grade

Programme:- Undergraduate Programme in Zoology (FYUGP)			
Semester:- I	**Course type:-MINOR-Theory Course**	**Course title:-Biodiversity of Non-Chordata**	
Course code:-UZOMNT-101	**Total marks:- 100**	**Total credits:- 4**	**Teaching hours:- 60 Hrs.**

Objectives of the Course:-

- To provide a basis for understanding the diversity within invertebrate groups, their inter-relationships and co-existence of different species ranging from unicellular to multicellular.
- To enable the students to understand and appreciate the importance of diverse life forms in animal kingdom.
- To provide an overview of the invertebrate animals, including protista, sponges, cnidarians, flatworms, nematodes, annelids, molluscs, arthropods, echinoderms.
- To provide knowledge of invertebrate phyla, their characteristic features, vital systems and special phenomenon exhibited by them, different modes of living etc.

Learning outcomes of the course:-After completing this course the students will get familiar with the minor and major groups of invertebrate animals, their similarities and differences, and the evolutionary pathways that resulted in the current numbers and variety of animal species. They will be able to:

- Comprehend the characteristics of various major and minor phyla.\
- Describe the distinguishing characteristics of all major phyla.
- Understand the fundamental differences among animal body plans and functions.
- Illustrate the life-cycles, structures, functions and reasons for importance of few representative organisms from different invertebrate groups.

UNIT 1: PROTOZOA **Teaching Hours: 09**

1.1 General characteristics of Invertebrates (Protostomes and Deuterostomes)

1.2 Protozoa

1.2.1 General characters of Protozoa.
1.2.2 *Paramecium*: Feeding mechanism, concept of cyclosis, defence mechanism
1.2.3 *Monocystis*: Structure and life-cycle
1.2.4 Types of locomotion in Protozoa
1.2.5 Reproduction in Protozoa

UNIT 2: PARAZOA **Teaching Hours: 09**

2.1 General characteristics of Parazoa
2.2 Functional morphology and reproduction in *Sycon*
2.3 Histological elements of *Sycon*
2.4 Canal system in Porifera
2.5 Elementary concept of minor phyla
2.6 Salient features and evolutionary significance of Ctenophora

UNIT 3: CNIDARIA AND HELMINTHS **Teaching Hours: 15**

3.1 Cnidaria

3.1.1 General characters of Coelentrates
3.1.2 *Obelia*: Structure, life-history and metagenesis
3.1.3 Polymorphism in Siphonophora
3.1.4 Defence structures and their mechanism in coelentrates

3.2 Platyhelminthes

3.2.1 General characteristics of Platyhelminthes
3.2.2 *Taenia solium*: Reproduction and life-cycle
3.2.3 *Fasciola hepatica*: Reproduction and life-cycle
3.2.4 Parasitic adaptations in Flatworms

3.3 Aschelminthes

3.3.1 General characters and Parasitic adaptations

UNIT 4: ANNELIDA AND ARTHROPODA **Teaching Hours: 15**

4.1 **Annelida**

4.1.1 General characteristics of Annelids
4.1.2 *Nereis*: Reproduction with special reference to Epitoky
4.1.3 Modes of life in Polychaetes
4.1.4 A brief concept of coelom and metamerism in Annelida
4.1.5 Structure and evolutionary significance of Trochophore larva

4.2 Arthropoda

4.2.1 General characteristics of Arthropods
4.2.2 Larval forms in Crustacea (Nauplius, Zoaea, Mysis and Megalopa)
4.2.3 Metamorphosis in Insects
4.2.4 Compound eyes and concept of mosaic vision in Insects

UNIT 5: MOLLUSCA AND ECHINODERMATA **Teaching Hours: 12**

5.1 Mollusca

5.1.1 General characteristics of Molluscs
5.1.2 Torsion in gastropods
5.1.3 Shell diversity in molluscs
5.1.4 Pallial complex in *Pila*
5.1.5 Foot modification in Cephalopoda

5.2 Echinodermata

5.2.1 General characteristics of Echinoderms
5.2.2 Water-vascular system in *Asterias*
5.2.3 Larval forms in Echinodermata

References:-

1. Text book of Zoology-Hyman series McGraw Hills.
2. Protozoology-Kudo, Books & Periodicals Corporation (India).
3. Text-book of Zoology-Sedwick series. Central Book Depot.
4. Text-book of Zoology-Parker and Haswell Vol. I. Mac Millan & Co. 1986, New York.
5. Protozoology-Mackinen and Hawez, Canb University.

6. Parasitic protozoa-Baker. Allen & Unwin, Inc. USA.
7. Human Helminthology-Faust, E.C, Lee and Febiger, Philadelphia.
8. Medical Parasitology- K. D. Charterjee
9. Helminthology- Kotpal
10. Arthropod Anatomy- Snodgrass. Principles of insect morphology (1935) Snodgrass, R.E. McGraw Hill London, New York.
11. Invertebrate- Bordale and Potts. C.L.
12. Manual of Zoology Vol. I (invertebrate) part I and II. Ayyar, E.K. &T.N. Ananlha-Krishnan (S. Vishwanathan, Printers & Publ. Pvt. Ltd. Madras).
13. Invertebrate Zoology-Jordan,E.L.& P.S. Verma (S. Chand & Co. Ltd. Madras).

Examination pattern shall be as under:-

1. 20 marks shall be earmarked for internal assessment (5 marks for attendance +15 for assessment test.
2. Scheme for award of marks for attendance shall be same as followed by the College.
3. Internal assessment test shall be conducted after the completion of 40% of the syllabus in a particular course.

Pattern for setting internal assessment test paper:-
Duration of the paper:- 1hour
The paper shall comprise of three sections:

a) Short answer questions - Attempt two questions of 2 marks each out of three questions(Maximum of 30 words each)
b) Medium answer question - Attempt two questions of 3 marks each out of 3 questions (Maximum of 50 words each)
c) Long answer question - Attempt one question out of two questions 5 marks(Maximum of 100 words)

Note:- Questions shall be set in such a way that the syllabi prescribed for the examination is fully represented

Pattern of External Examination:-
Total marks:- 80 **Time allowed:-** 3 hours
The paper shall comprise of 3 sections:

a) Short answer questions - 5 questions of 3 marks each (one question shall be asked from each unit).All questions are compulsory.
b) Medium answer questions – 5 questions of 7 marks each(one question shall be asked from each unit).All questions are compulsory
c) Long answer questions:- 5 questions be set from five units, and the students shall be asked to attempt 2 questions only. Each question shall be of 15 marks.
(The word limit shall be same as is the usual practice in external examination of similar weightage).

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Programme:- Undergraduate Programme in Zoology (FYUGP)		
Semester:- I	**Course type:-MINOR- Practical Course**	**Course title:-Biodiversity of Non-Chordata**
Course code:- UZOMJP-101	**Total credits:- 2**	**Total marks:- 50**

Objectives:-

- To enable the students to appreciate the animal diversity.
- To offer first-hand study of the preserved animal forms in the laboratory/ live forms in the field visits.
- To examine all the major groups of invertebrate animals, starting with the most structurally simple and finishing with highly specialized and complex creatures like molluscs and echinoderms.
- To improve the practical skill of the students in preparing permanent slides from the animal tissues.

Learning outcomes:-

Upon completion of this course, the students will be able to:

- recognize major animal phyla and their representative types on the basis of their morphological characteristics.
- identify the morphological and anatomical structures of animal tissues through prepared slides/charts/pictures.
- identify various adaptations shown by different parasites for their successful existence.
- exhibit a keen interest and curiosity in animal studies.

Total marks:- 50 **Total Credits:-** 2

Practical Exercises:

I. Distinguishing characters & classifications of the following Invertebrate phyla:

1. Protozoans: *Euglena, Plasmodium, Paramecium* and *Vorticella*
2. Poriferans: *Sycon, Hyalonema,* and *Euplectella*
3. Coelentrates: *Hydra, Obelia, Millepora, Physalia, Aurelia, Tubipora, Gorgonia, Pennetula* and *Metridium*
4. Platyhelminthes: *Planaria, Fasciola hepatica, Taenia solium*and *Echinococcus*
5. Aschelminthes: *Ascaris lumbricoides, Ancylostoma*and *Wuchereria*\
6. Annelids: *Aphrodite, Pheretima, Nereis, Chaetopterus* and*Pontobdella*
7. Arthropods: *Palaemon, Cancer, Palamnaeus, Scolopendra, Julus, Apis* and *Pediculus.*
8. Molluscs: *Chiton, Dentalium, Pila, Unio, Loligo*and *Octopus*
9. Echinoderms: *Pentaceros, Holothuria, Echinus* and *Antedon*

II. Preparation of permanent stained mounts of *Obelia, Campanularia*and*Sertularia*

III. Study of parasites with special reference to their parasitic adaptations: *Plasmodium, Entamoeba, Trypanosoma, Fasciola, Taenia, Wuchereria, Hirudinaria, Pediculus*, Tick and mite
IV. Study of Spicules of sponges through permanent slides/photographs/chart.
V. Study of legs of honey bee through permanent slides/photographs/charts
VI. Study of *Limulus*as a Livingfossil.
VII. To study the phenomenon of Epitoky in *Nereis* through charts/photographs/ppts.
VIII. To study the shell diversity in molluscs through specimens
IX. Field visit to an Aquatic body for the study of aquatic invertebrates.
X. Field visit to study the insect diversity of the site.
XI. To make a check-list of the zooplankton from a water body.
XII. An "animal album" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Examination pattern:-

A) Internal assessment

Weightage of Internal assessment:- 50% i.e. 25 marks out of 50.

Components of internal assessment:-

a. 5 marks for attendance. Marks shall be awarded as per the rules already followed by the College
b. 6 marks earmarked for the daily performance of the students in the practical exercises. The evaluation of daily performance shall be undertaken as per the standard α β γ scheme being followed in the College.
c. 6 marks are earmarked for minor project assigned to each student. Students shall have to submit the project report according to a prescribed format on the day of internal assessment test
d. 8 marks earmarked for internal assessment test in practical. The nature of the test shall be similar as is already followed by the College

A) External examination:-

Weightage of external examination:- 50% i.e., 25 marks out of 50. The examination pattern shall be same as followed by the College.