

Board of Studies meeting of the Department of Zoology was conducted on 26/03/2018 at 10 am in the Department of Zoology.

The meeting commenced with a silent prayer after which, Member Secretary Dr. Nisha P Aravind welcomed the Chairman and the other members present during the meeting. Additions and exclusions made within the syllabus were discussed and the following resolutions were taken after the meeting.

B.Sc. Curriculum

Core I. General perspectives in science and protistan diversity

1. No changes were incorporated as the syllabus was at par with national and international standards. But URL links were included in references for web search

Chairman emphasised to look into the distribution and allocation of teaching hours for each topic

Core 1. Practical

Additions: Some experiments were incorporated for imparting practical skill, to understand the concepts studied in theory part and to identify common representatives of the Kingdom. They include

- i. Important representatives of the Kingdom were specified as examples in the experiment for protists and parasitic protists.
- ii. Identification using computer aided keys to acquaint with the latest mode of classification tool and to identify marine protists
- iii. Preparation of paramecium culture and its mounting to accustom students with the typical organism of the Kingdom
- iv. Study of rectal ciliates of frog
- v. Demonstration of *Trichonympha* found in termites to understand the symbiotic protist
- vi. Identification of symmetry and body cavity to understand the basic concept used in classification

It was suggested to modify the study of rectal ciliates in frogs by using slides or figures rather than dissection

Deletions: Some practicals were omitted which were not up to the standard but few others were replaced to cover practicals from all the modules in theory part of the course paper. The deletions were made for-

1. Identification of fishes and snake which is not apt in the non-chordate part. To learn the concept, identification of insects using taxonomic keys is sufficient.
2. Taxa identification techniques of bird, butterfly/dragon fly body parts is not up to the standard as it is a very basic concept which is already known to students from school level.
3. Identification of 2 protist from pond water, is replaced by practicals which will help students to gain much broader knowledge about Kingdom Protista.

Core II. Animal Diversity- Non Chordata

Additions: Names were given to modules based on levels of organisation, common examples were incorporated and few minor changes were made. They are:-

1. A brief account of Branch Eumetazoa included in Module I for making the classification comprehensive.
2. Phylum Coelenterata and Ctenophora compiled in Radiata, based on symmetry
3. Life cycle of *Rhizostoma* included
4. Phylum Platyhelminthes and Nematelminthes is combined in Module III, and given the name as Acoelomata and Pseudocoelomata.
5. In Module 4, Eucoelomata I, Phylum Annelida, Arthropoda and Onychophora were dealt with.
6. Example of Pycnogonidae changed to *Nymphon* as it is more familiar species

7. *Palinurus* and *Cancer* (local fauna) were added as representative examples for Class Malacostraca
8. Dragon fly and mosquito added as representative examples for Class Hexapoda as these are local fauna. Moreover to get a generalized outline of the largest class more examples had to be given.
9. In module 5, Eucoelomata II: Phylum Mollusca, Echinodermata, Hemichordata and minor phyla were included.
10. As representative example for Class Cephalopoda, commonly known mollusc, Octopus included
11. To understand the significance of development patterns, larval forms of Echinodermata were included
12. QR code was generated for viewing the relevant video of the organisms in www.youtube.com

Practical

Additions: Some practical were incorporated for the development of psychomotor skills of students and others for instilling curiosity on animals and love for nature

1. Parapodium of Nereis and setae of earthworm were included to understand the concept of appendages
2. To get an idea on the anatomy dissection of digestive system and mounting of salivary apparatus and of cockroach were included
3. Name of the specimens for identification were specified to give more importance to local fauna
4. Submission of photo album of local invertebrates to instil curiosity as well as to acquaint students with local biodiversity

Deletions:

1. Identification of insects, omitted as it is already given in Semester I practical

It was suggested to add the study of digestive system of cockroach along with the study of salivary apparatus

Core Semester III Animal Diversity- Chordata

Additions: Module names were given and additional examples were included

1. Modules were named
2. As an example for class Thaliacea, *Salpa* also included
3. All subphylum and divisions were categorized in the first module
4. Superclass Pisces cited as module 2
5. *Myxine* also included in Cyclostomata to give a broader understanding.
6. *Scoliodon* included in subclass Elasmobranchi as it is common
7. *Sardinella*, *Mugil* and *Cybiium* were included in Teleostei as these are local fauna.
8. *Bufo* added as representative example for Order Anura.
9. Salient features and basis for classification were incorporated in reptiles, as it is a requisite for students
10. Affinities of *Sphenodon* added because of its evolutionary significance
11. *Naja*, the common cobra opted as representative example for Order squamata
12. Turtle and tortoise included as representative example for Order Anapsida
13. General topic is changed to identification of venomous snakes of Kerala in order to identify and understand local fauna.
14. General features and origin of birds were incorporated in birds, as it is a requisite for students
15. *Emu and Kiwi* were included in Paleognathae to familiarize students with locally reared flightless birds.
16. *Columba*, *Pavo* and *Eudynamus* included as representative examples for Neognathae, to familiarize students with local fauna and also our national bird.
17. Topic on Indigenous cattle breed of Kerala with special emphasis to Vechur Cow was added since the conservation is of local significance.
18. Some references were added to make the students aware about recent developments
19. QR code and website link were included to get a better knowledge about the organisms studied

Practical

Additions

1. Virtual dissection of frog added as per UGC guidelines
2. Study of the dissected and preserved specimen of cranial nerves of frog, to get a better knowledge of the nervous system
3. Dissection of teleost fishes to familiarise students with anatomical features of chordate
4. Study of the preserved digestive system of Calotes, Pigeon and Rat to familiarize with comparative anatomy of chordates
5. General identification specified to make students aware about the common and local chordates
6. Indigenous cattle breed of Kerala added to make them aware of the need to conserve our local varieties.
7. Report on bird watching or photo album of local chordates included for observing the local birds.

Core Semester IV Research methodology, Biophysics and Biostatistics

Additions

1. Topics in Module I - Research methodology were rearranged
2. In Module II Animal collection tools and techniques, Shannon Wiener index included as it is a widely used diversity index
3. Dry and wet preservation techniques and laboratory rearing techniques of experimental animals added as they are useful in research and project works
4. A brief account of paper, thin layer, HPLC and agarose and SDS Page included
5. Relevant and latest references and web pages were added

Suggested to check the topic on units of measurement whether it is given in the chemistry topics

Deletion:

1. As per the suggestions of BOS the topic on unit of measurements is deleted from theory

Practical

Additions

1. Research methodology portion is divided to 2 sections- 1. Sampling and measurements and 2. Collection and preservation
2. Shannon Wiener index included as it is the most relevant sampling measurement
3. Collection and preservation of planktons and insects incorporated to meet with the theoretical aspects
4. Problems regarding the calculation of molarity and normality and preparation of chemicals
5. Study of simple and compound light microscopes is revised to Microscope and its handling to familiarize students with the use and focussing of microscopes
6. Measurement of a given sample and use of the data to solve statistical problems will help students to apply the theoretical knowledge (Practical 3 & 6)
7. Census of avian fauna and interpreting in graphical form, to familiarize with statistical applications
8. Web links were given for quick search

Suggested that topics from research methodology and preparation of chemicals should be included in the practical

Deletions:

1. Paper chromatography as this is repeated in core course practical VIII
2. Internet access of a web page is irrelevant as students use this as part of seminars and assignment

Core Semester V Environmental biology and human rights

As directed by the curriculum committee of CMS College it was decided to follow the UGC guidelines regarding Environmental biology and Human rights of semester V. A common pattern was prepared for all the departments with five modules except Botany and Zoology with four modules as they

had 36 hrs practical. Modules 1, 2 and 5 was kept common and modules 3 and 4 could be changed as per the requirements of the specific subjects. For Botany and Zoology changes could be made in module 3 and the fourth module was assigned for Human Rights.

Addition

1. Natural, forest, water, mineral, land, food resources added to make students aware of their role in ecosystems and the future implications in conservation biology
2. Types of biodiversity- Alpha, beta and gamma diversity
3. Role of individual in conservation and equitable use of resources for sustainability
4. Wild life conservation in India to get awareness about wild life
5. Household waste management to make the students aware about waste management within their homes and to spread the message to society.
6. Euthanasia included in human rights

Deletion

1. Productivity (functions of ecosystem Module 1)

Practical

Additions

1. Estimation of potassium in soil or water
2. Estimation of phosphate in soil or water (group activity)
3. Construction of food chain or food web to help students learn about the concept
4. Study of rocky or sandy shore to help students learn about the ecological interactions, included as activity for students.
5. Study of animal association one from each category specified
6. Identification of pollutants or pollution cases to create awareness
7. Identification of environmental issues, as it is most relevant

Core Semester V Cell biology and Genetics

Additions

1. Module I-titled as Cell biology
2. Mendelian genetics, interaction of genes, multiple alleles, sex determination, recombination and linkage and sex linked inheritance compiled in module II Genetics
3. Mutation and human genetics compiled as single module III Human Genetics

Practical

Additions

1. Preparation of temporary whole mounts of tissues to enable them to understand cell diversity
2. Preparation of permanent whole mounting demonstration using histological sections.
3. Photomicrography demonstration, as it is relevant
4. Pedigree analysis chart to help student understand the concept
5. Preparation of karyo-idiogram from microphotographs was included

Deletions

Preparation of permanent slides of tissues as this is included in core course practical VIII physiology and biochemistry

Core Semester V Evolution, Ethology and Zoogeography

Additions

1. Module names were changed
2. Evidences for evolution to include anatomical, morphological, paleontological, embryological, taxonomical and biochemical evidence to make students more clear about the concept of evolution
3. Continental drift theory added, to give an idea on the concept of origin of continents and distribution patterns of animals

Practical

Additions

1. Continental and oceanic areas to be marked in world map is specified
2. Preparation of cladogram using the specimens provided
3. Problems based on Hardy -Weinberg equilibrium included in tune with theory
4. Study of homology and analogy specified as homologous organs (limbs of 5 groups of vertebrates) and analogous organs as wings of birds, insects and bat
5. Vestigial organs in humans- photographs(any four)
6. Adaptive radiation in beak of birds (picture/photograph)
7. Study of variations in *Drosophila* (wing venation, body colour)
8. Earthworm or drosophila for demonstrating phototaxis or chemotaxis
9. Demonstration of alarm pheromones in ants

Deletions

1. Any 2 oceanic or continental islands to be marked on a world map, as this is insufficient for the students to recall the concept
2. Contributions of scientists, as students are made aware of these during theory hours

Core Semester V Physiology and Biochemistry

Additions

1. Types of nutrition, as it a basic concept
2. Health and life style diseases, as it is very relevant topic
3. Types of respiration
4. Phases of respiration
5. Bohr effect, reverse Bohr effect and Haldane effect included in transport of gases
6. Anoxia and hypocapnia included in respiratory disturbances
7. Types of heart, cardiac cycle, Control and rhythmicity of beat, Pace makers included in circulation
8. Blood pressure and disorders, neural and hormonal control.
9. Human blood and its constituents, normal levels
10. Disorders of blood clotting
11. Blood groups and transfusion
12. Arteriosclerosis in cardiovascular diseases
13. Haematocrit in clinical analysis
14. Patterns of nitrogen excretion in animals: ammonotelism, ureotelism, urecotelism
15. Composition of urine – normal and abnormal constituents
16. Pyelonephritis in renal disorders
17. Module II termed as muscle physiology
18. Types of muscles
19. Electrophysiology of muscle, threshold and spike potentials
20. Whole muscle contraction, isotonic and isometric contraction, latent and refractory periods, summation, tonus, staircase phenomenon, oxygen debt.
21. Types of neurons
22. Schizophrenia, autism included in neural disorders
23. Website link mentioned in reference part

It was suggested by BOS to add the normal metabolite levels in human blood, the buffering mechanism of blood and to include autism

Deletions

1. Mechanism of action of anticoagulants
2. Thermal regulation and thermal adaptation in homeotherms as it can be briefed with concept and importance of homeostasis
3. Cori cycle
4. Muscle proteins (myosin, actin, tropomyosin, troponin) as it will be mentioned in muscle contraction

Practical

Additions

1. Permanent slides of tissues

2. Identification of specific nutritional, renal, cardiac and neural disorders using photographs

Core Semester V Open Course -Vocational Zoology

Out of the three open courses suggested by University we have opted Vocational Zoology as we have developed field and laboratory set up where the applied field are carried out. No changes were made to the content, as the syllabus was at par with international and national standards

Core Semester VI Developmental biology and Endocrinology

- Additions: modules were named, some translocations were made
 1. Module I Reproduction
 2. Module II Process of development
 3. Module III Developmental stages
 4. Gestation, parturition and lactation transferred from module I to III
 5. Module IV Techniques and functions
 6. Embryo transfer technology transferred from module IV to III
 7. Module V Endocrinology
 8. Gonadal hormones and their functions, female reproductive cycles shifted from module I to module V
 9. GI hormones and the role of hormones during gestation, parturition and lactation was added
 10. Normal hormonal levels in human beings included
 11. Gastro intestinal hormones included

Deletions

1. Cloning, stem cell research, ethical issues as it is included in core course X

Practical

No changes were made in developmental biology practical but endocrinology practical included

Core Semester VI Microbiology and Immunology

Additions

1. A brief account on MHC added as it a major immunologic process, especially involved in transplantation
2. Complement system, biological effects of complements – a brief study, as it important concept in immunology
3. Website link included

Practical

No changes were made in practical as it meets international and national standards

Core Semester VI Biotechnology, Bioinformatics and Molecular Biology

Additions: Names were given to modules

1. Module names were changed
2. In agricultural application, biofertilisers were specified as cow products, microbes, compost etc. because of its significance in increasing soil fertility and soil health
3. Waste management using microbes in aerobic and anaerobic compost unit, as it is having local and social relevance
4. Bioremediation of oil spills and sewage water using microorganisms as it is having national and international significance
5. Major biotechnology research centres in India was included
6. Basic concepts of drug discovery pipeline, Computer aided drug discovery and its applications.

Practical

Additions

1. DNA sequencing/ DNA fingerprinting
2. ELISA – demonstration
3. Sequence similarity search using BLAST
4. Biopesticide preparation (Any 2) (Group activity)
5. Biofertilizers - EM solution, panchagavya, archae bacteria (any one)
6. Soxhlet extraction method for extracting the bioactive products from medicinal plants (*Ocimum*, *Nerium*, *Azadirachta*)(any 1) (demonstration)
7. Evaluation of the activity of the extracted bioactive products (microbial inhibition zone)
8. Isolation of DNA from microorganism using DNA isolation kit (group activity)
9. Electrophoresis (SDS -PAGE and agarose gel) (demonstration only)

Deletions

Write down the procedure involved in DNA isolation

Core Semester VI Occupational Zoology

Additions

1. Meliponini Culture, as it relevant and useful for self-employment
2. Morphology of earthworm
3. Factors affecting the growth and multiplication of earthworm
4. Vermiwash applications
5. Change in soil properties by the influence of earthworms
6. Harvesting and packing of vermicompost
7. Common fish diseases and management

Deletions

Common diseases of aquarium fish and management is omitted because it is addressed for both ornamental and aquaculture

Practical

Additions

1. Economic importance and morphology of culturable fishes : Mrigal
2. Economic importance and morphology of shell fishes : any 2 species of Prawn, 1 marine mussel, one rock oyster - *Crasostrea*
3. Setting up of ornamental fish tank (small aquarium) (group activity)
4. Identification and study of bee diseases
5. Identification and uses of Quail egg, Quail meat
6. Mounting the leg of honeybee
7. Preparation of a miniature vermibed using the materials provided

Deletions

1. Mounting of pollen basket, as it is replaced by mounting the leg of bee
2. Separation of cocoon from worm castings as it is practically difficult to sort out

Core Semester VI Elective- Agricultural pest management

No changes were made to the syllabus as it was at par with national and international standards Names were given to modules.

Complementary course

Semester I Non Chordata

Additions

Protists were grouped into holozoic, holophytic, parasitic, and algal protists

Practical

Additions

1. Simple identification- more specimens included
2. Mounting - Mouth part of Cockroach included
3. Observation of live paramecium in hay infusion

Semester II Chordata

No changes were made to the syllabus as it was at par with national and international standards

Practical

Additions

Scientific drawing

Dissection: Digestive system of teleost fish

Semester III- Physiology and Immunology

No changes were made to the syllabus as it was at par with national and international standards

Practical

Additions

Additional instruments like Kymograph, Dialysis machine, ECG machine were added

Mounting of striated muscle of cockroach included

Permanent Slides- Striated, non-striated, cardiac muscle included for identification

Semester IV Applied Zoology

Additions

Common species of aquarium fishes

Practical

Addition

Test for determining adulteration in honey

Mounting

- Leg of honey bee
- Mouthparts honey bee

Preparation of vermibed (group activity)

As we have received instruments from the star college scheme, we have included some experiments which can be performed in the degree laboratory.

The experiments include

Semester IV Core Practical- Photomicrography of microscopic objects

Semester V Core Practical - Estimation of phosphate in soil/ water

Estimation of potassium in soil/water

Semester VI Core Practical-

- Soxhlet extraction method for extracting the bioactive products from medicinal plants
- Isolation of DNA from microorganism using DNA isolation kit
- Electrophoresis (SDS -PAGE and agarose gel)

BOS Chairman thanked everyone for their cooperation and meeting came to an end at 1.45pm

(Member Secretary)

(Read and confirmed)

(Chairman)

Kottayam
26-03-2018