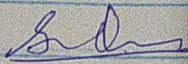
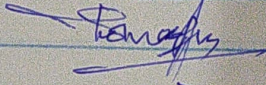
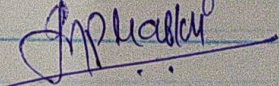
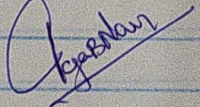
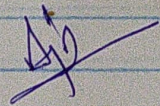

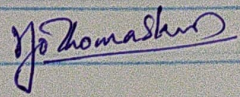
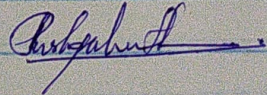
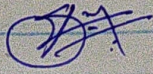
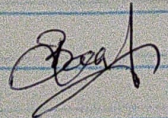
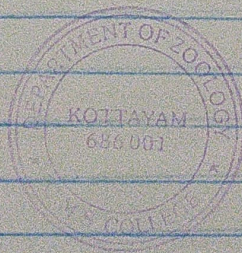


Minutes of the (BOS, 19. 1st) meeting of Board of studies - Zoology of CMS College, Kottayam (Autonomous) held at 10.00 am on 10th April 2019.

Members Present

1. Dr. Sosamma Oommen (Chairman) 
2. Dr. A. P. Thomas (University nominee, Director ACESSD, M. G University, Kottayam) 
3. Dr. G. Nagendra Prabhu (Subject Expert, Associate Professor, Dept. of Zoology, SD College, A) 
4. Dr. Maya B. Nair (Alumni Representative) 
5. Mr. Ajesh James (Beneficiary representative) 
6. Dr. Jobin Mathew 
7. Mr. Vijo Thomas Kurien 
8. Dr. Pushpa Geetha S 
9. Mr. Sony Joseph 
10. Dr. Baaby Job 



The meeting started at 10:15 am with a silent prayer followed by the welcome address by the chairperson Dr. Socamma Oommen and in her introductory speech she explained the details of agenda and the academic matters to be discussed. The rough draft of the syllabus of each courses were presented by the concerned faculty member and were discussed in detail. The following were the agenda of the meeting.

Items on the Agenda

- Item 1. Post graduate (M.Sc. Zoology) syllabus revision
- Item 2. Approval to include model question paper and blue print
- Item 3. Approval of list of experts to be involved in question paper setting and evaluation
- Item 4. Any other matters

Agenda Item No.1 Post graduate (M.Sc. Zoology) Syllabus revision

It was decided to revise the syllabus of M.Sc. Zoology programme offered by the Department of Zoology. The revised syllabus is planned to introduce in C.M.S College Kottayam w.e.f. June, 2019 admissions. The feedback gathered from various stakeholders such as students, teachers, parents, industrialists, employers etc. Were discussed. The restructuring of the syllabus was made in tune with the UGC model syllabus and the existing syllabus of the MG University. The syllabus was restructured by mapping the courses and incorporating graduate program outcomes (GPO), Program specific outcomes (PSO) and course outcomes (CO).

The courses in M.Sc. Zoology were devised in such a manner:

1. To provide further insight into how 'life' sustains on the earth and also to make students aware of the recent scientific advances and discoveries.
2. Care was taken to incorporate local, national, regional and global issues related to life, biodiversity and its existence.
3. The existing courses were streamlined with focus on employability, entrepreneurship and skill development.
4. In order to facilitate the courses, it was decided to sign MoU with institutions and organizations relating to the discipline that would be helpful to the students.

The additions, deletions and suggestions made within the syllabus were discussed and the following resolutions were taken at the meeting.

SEMESTER – I CORE COURSE 1. BIOSYSTEMATICS AND ANIMAL DIVERSITY COURSE CODE ZY1921101

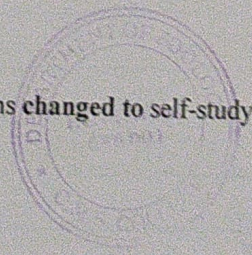
Additions

Module 1

1. Hierarchy of categories and higher taxa and Levels of organization in animal kingdom changed to self-study

Module 4

2. Larval forms of Annelids, Molluscs, Arthropods and Echinoderms changed to self-study



3. classification of arthropoda and Echinodermata **changed to self-study**
4. Adaptive Radiation in Mollusca changed to adaptive Radiation in gastropods

Module 5

5. Cephalochordates and Urochordates **changed to self-study**
6. Classification of birds and Mammalia **changed to self-study**
7. Phylogeny of mammalian with special reference to primate order

Deletions

Module 4

1. Cnidaria polymorphism
2. Impact of sedentary life on the organization of invertebrates.-- prerequisite

Module 5

3. Tetrapod phylogeny-- status and threats
4. Structural and functional modifications for aerial life

BOS recommendations

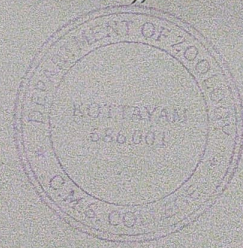
- Self-study
- Reference upgrade
- Include Manual of Zoology by Ekambaranatha Iyer in references
- Primate phylogeny to be emphasized in Phylogeny of mammals
- Adaptive radiation in mollusc to be changed to gastropods

SEMESTER – I CORE COURSE 2. EVOLUTIONARY BIOLOGY AND ETHOLOGY COURSE CODE ZY1921102

EVOLUTION

Additions

1. Miller-Urey experiment, Methanogens-Oxygen and photosynthesis-Cyanobacteria
2. Stromatolites-Banded iron formations
3. Origin of nucleus- gene structure Introns early and introns late hypothesis,
4. Origin of earth (brief mention only), brief mention about human ancestor fossils upto Homo luzonensis), Origin of humans : Cradle of Human evolution- OOA(Out of Africa) hypothesis- aridity hypothesis
5. Turnover-pulse hypothesis- savannah hypothesis, Lucy, Paternal mtDNA transmission
6. Social evolution, Punctuated equilibrium vs Gradualism,
7. Natural selection and selective breeding
8. Evidences : Rose Mary and Peter Grant (Molecular evolution in Darwinian finches),
9. Evolution of MDR-TB (Multi drug resistant TB), Evolution of HIV,
10. Evolution occurred in Italian Wall lizard, Podarcis sicula,



11. Evolution of Sex: conjugation in paramecium- Chlamydomonas reproduction- sexual reproduction in Volvox

Deletions

1. Anaerobic metabolism, aerobic metabolism, Idea of Panspermia, Modern theory of evolutionary synthesis.
2. Rate of change in gene frequency through natural selection. Small population size effects - Genetic drift. Founder principle, Bottleneck effect.
3. Gene flow, recombination, non-random mating, Neutralist versus Selectionist.
4. Cropping and, criticisms on Punctuated equilibrium, Universal Darwinism.
5. Gene duplications and evolution of multigene families,
6. Mobile genetic elements – transposable elements,
7. Genetic and evolutionary effects of transpositions. Retroposition, retroposons.
8. Developmental genes and gene co-option, Factors in human origin, hominid fossils.
9. Human evolutionary genetics - Cytogenetic and molecular basis of origin of man,
10. Tracing human history with Genetic markers, human brain

ETHOLOGY

Additions

1. The relevance of biological clocks for human welfare - Clock function (dysfunction);
2. Human health and diseases - Chronopharmacology, chronomedicine, chronotherapy

Deletions

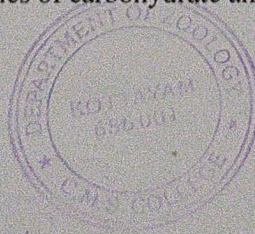
1. Historical background, Stimulus-Response, Causal factors, Quantitative aspects - Duration, interval frequency, Behavior bouts. Scope of ethology.
2. Reflex action, Kinesis, Taxes, Fixed action patterns.
3. Sherrington's neuro-physiological concepts in behavior - Latency, summation, fatigue.
4. Goal oriented drive, internal causal factor, Homeostatic and Non-homeostatic drives.
5. Hormones and behavior, Psycho-hydrologic model of motivation, Short and long term memory, Aggregations - schooling in fishes, herding in mammals, Genetics of biological rhythms, Evolution of communication.

**SEMESTER – I CORE COURSE 3. BIOPHYSICS, INSTRUMENTATION AND BIOLOGICAL TECHNIQUES
COURSE CODE ZY1921103**

Additions

Module –II

1. Bioenergetics of Photosynthesis, Bioenergetics of carbohydrate and fatty acid oxidation



Module –III

2. image processing methods in microscopy, Principles of chromatography, Principles of electrophoresis

Module IV

3. Patch-clamp recording, ECG, Brain activity recording, PET, MRI, fMRI, CAT, DNA Sequencer

Deletions

Module –II

1. Transport – endocytosis, exocytosis, Nutrient transport across membranes, porins facilitated diffusion, porter molecules; facilitated transport: symport, antiport, uniport, anion porter, glucose porter; Active transport: proton pumps, Na⁺ K⁺ pumps and Ca⁺⁺ pumps, ionic channels.

Module –III

2. Thermodynamics- Laws of thermodynamics, Entropy, Enthalpy, Free energy. Reversible thermodynamics and irreversible thermodynamics; Systems – open, closed and isolated. Photo bioenergetics. Photosynthesis – light and dark reactions

Module –IV

3. Radioiodine in thyroid function analysis. Renal, liver and lung function analysis.

SEMESTER – I CORE COURSE 4. BIostatISTICS, COMPUTER APPLICATION AND RESEARCH METHODOLOGY COURSE CODE ZY1921104

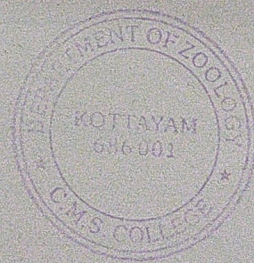
BIostatISTICS

Additions

1. Brief account of steps in statistical investigation
2. Harmonic mean- Problems based on ungrouped and grouped data
3. Geometric mean- Problems based on ungrouped and grouped data
4. Skewness and Kurtosis - Problems based on ungrouped and grouped data
5. Probability theory -Definitions and terminology
6. Theorems in Probability(problems based on addition ad multiplication theorems)
7. Analysis of Variance (ANOVA - One way analysis only)

Deletions

1. Relative measures of dispersion
2. Probit analysis and VBG model
3. McNemar and Mann Whitney μ test



COMPUTER APPLICATION

Additions

1. Definition Characteristic of a computer
2. Organization of a digital computer system
3. Artificial intelligence and Zoobotics
4. Steps in programming
5. Virus ,Worms, Spyware ,Adware, Ransom ware
6. Antivirus software

RESEARCH METHODOLOGY

- No changes were suggested in this section

SEMESTER 1

ZY1921601 PRACTICAL 1: BIOSYSTEMATICS AND ANIMAL DIVERSITY, EVOLUTIONARY BIOLOGY AND ETHOLOGY, BIOPHYSICS AND INSTRUMENTATION, BIostatISTICS, COMPUTER APPLICATION AND RESEARCH METHODOLOGY

Restructured modules

- Biosystematics and animal diversity, evolutionary biology and ethology
- Biophysics/instrumentation/biological techniques
- Biostatistics
- Computer applications

Additions

1. Biophysics/instrumentation/biological techniques - previously included along the second semester practical added to the first semester
2. Principle and working of Colorimeter, Ultracentrifuge, Laminar air flow, Soxhlet extractor, Flame Photometer ,Spectrophotometer
3. Calculation of regression coefficient and regression equation (X on Y and Y on X)
4. Construction of frequency distribution using excel
5. MS Excel-ANOVA (one way analysis)
6. Creating a personal blog and posting an article on any biological topic

Deletions

1. Length weight relationship analysis



SEMESTER – II CORE COURSE 5. ECOLOGY-PRINCIPLES AND PRACTICES
COURSE CODE ZY1922105

Restructured modules

- **Module 4:** Resource ecology
- **Module 5:** Environmental stresses and their management

Additions

1. Invasive alien species- Animal & Plant
2. Ecological importance of Western Ghats & Vembanad ecosystems

Deletions

1. Resilience

SEMESTER – II CORE COURSE 6. GENETICS AND BIOINFORMATICS
COURSE CODE ZY1922106

Additions

1. Definition of factors, alleles, multiple alleles, pseudoalleles, Beadle and Tatum's One gene one enzyme concept, One gene one polypeptide concept, Cistron, Recon and Muton.
2. Examples for extra chromosomal inheritance
3. Human genome and mapping methods, HapMap Project, The 1000 genome project, and The ENCODE Project.
4. Bioinformatics in India -the current status and future implication.
5. Tools for phylogenetic analysis- phylip and clustlw
6. Genomics and Proteomics
7. Assembly of a contiguous DNA sequence- shotgun method, clone contig method, and whole –genome shotgun sequencing

Deletions

1. All Prerequisites -as these are dealt in the degree courses.
2. Polytene and lamp brush chromosomes – dealt in degree cell biology course

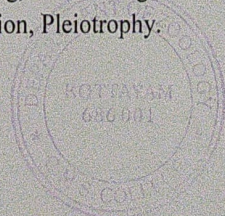
SEMESTER – II CORE COURSE 7. DEVELOPMENTAL BIOLOGY
COURSE CODE ZY1922107

Additions

1. Module II. Gametogenesis, Fertilization and Early development in the previous syllabus is given under self-study as they have already studied it in B.Sc. course

Deletions

1. The topics which are repeated in the genetics and molecular biology part are omitted.
2. Differential gene transcription - exons and introns, promoters, silencers, enhancers, genomic imprinting, dosage compensation, differential RNA processing, control of gene expression: translational and post translational control of gene expression, Pleiotrophy.



3. Lens regeneration in amphibians

**SEMESTER – II CORE COURSE 8. BIOCHEMISTRY
COURSE CODE ZY1922108**

Additions

1. First module in the previous syllabus were given under self-study as they have already studied it in subsidiary chemistry
2. Inborn errors of metabolism of all the biomolecules.
3. Self-study of Vitamins were included as the topic is given in NET/JRF syllabus

Deletions

1. Instead of giving the names of examples, the names were omitted
2. Under nucleic acids, the topics which are repeated in the genetics and molecular biology part were omitted.

**SEMESTER – II PRACTICAL II. ECOLOGY-PRINCIPLES AND PRACTICES,
GENETICS AND BIOINFORMATICS, DEVELOPMENTAL BIOLOGY &
BIOCHEMISTRY
COURSE CODE ZY1922602**

- No changes were suggested as it meets national and international standards

**SEMESTER – III CORE COURSE 9. ANIMAL PHYSIOLOGY
COURSE CODE ZY1923109**

Additions

1. Module I. Mechanisms of food intake in different animals, physiology of digestion and absorption, symbiotic digestion is given under – **Self study**

Deletions

The following topics are studied in the B.Sc. course and basics

1. Module III Respiratory centres and periodic breathing, regulation of respiration. Structure and functioning of respiratory pigments. Metabolic rate: basal metabolic rate and its measurement.
2. Module IV Physiology and regulation of urine formation
3. Module V Neuroanatomy of the central and peripheral nervous system. Electrical and chemical transmission. Synaptic transmission.
4. Module VI Structure of invertebrate and vertebrate eye, vertebrate ear,
5. Module VII Skeletal muscle - ultra structure and molecular organization. Effect of exercise on muscles, mechanism of muscle contraction and relaxation.
6. Module IX Endocrine glands



7. Module X Anatomy and histology of adult testis and ovary, Impact of senescence and age on reproduction.
8. Invertebrate endocrine system – **topic repeated in the Entomology part**

**SEMESTER – III CORE COURSE 10. CELL AND MOLECULAR BIOLOGY
COURSE CODE ZY1923110**

Restructured modules

- Cell membrane, cell junctions, cell adhesion and extracellular matrix
- Cell organelles and cytoskeleton
- Cell signalling
- Cellular reproduction and cancer
- Gene expression and regulation of gene expression

Additions

1. Role of p53 in cell division and cancer
2. Gene editing (CRISPR-CAS system)

**SEMESTER – III CORE COURSE 11. MICROBIOLOGY AND BIOTECHNOLOGY
COURSE CODE ZY1923111**

Additions

1. Bacteria in Agriculture (Bio fertilizers- Rhizobium) growth promoting bacteria, Azospirillum. (Bio pesticides – Bacillus thuringiensis)
2. A brief account of economic importance- Industry-brewing, Medicine-vaccines, hormones and environment bioleaching, bioremediation
3. Viruses and the future: Promises and problems. Emerging diseases, sources and causes of emergent virus diseases.
4. Silver lining: viruses as therapeutic agents, viruses for gene delivery, viruses to destroy other viruses. Importance of studying modern virology.
5. Principles of quality control and microbiological criteria, Indicators of product quality and microbiological safety of foods, Hazard analysis
6. Medical mycology: Dimorphism Mycoses –Superficial, Opportunistic, Systemic, Antifungal agents
7. Genetic engineering: Cloning hosts : *E. coli*, *Saccharomyces*, Plant and animals cells
8. Types of PCR

Deletions

1. Prerequisites



**SEMESTER – III CORE COURSE 12. IMMUNOLOGY
COURSE CODE ZY1923112**

Deletions:

1. Scavenger receptors and Toll – like receptors.
2. Affinity and Avidity. Cross reactivity
3. Genomic map of H-2 Complex in the mouse.
4. MHC and disease susceptibility. Biological significance of MHC
5. Induction of autoimmunity
6. Tumor immunology - Tumors of the immune system, Tumor antigens, Tumor evasion of the immune system
7. Nobel prizes for discoveries in Immunology.

**SEMESTER – III PRACTICAL III- CELL AND MOLECULAR BIOLOGY,
MICROBIOLOGY & BIOTECHNOLOGY
COURSE CODE ZY1923603**

- No changes were suggested as it was at par with national and international standards

**SEMESTER – III PRACTICAL IV- ANIMAL PHYSIOLOGY AND IMMUNOLOGY
COURSE CODE ZY1923604**

Additions

Module 2

1. The threshold for sugar of the tarsal taste organ of butterflies
2. Effect of temperature on the movement of insects (graph plots showing the relationship between temperature and time of movement)

Module 4

3. Preparation of haemin crystals, Clotting time of blood, Bleeding time

Module 5

4. Identification of Autoimmune disorders (Pictures may be used)
5. Demonstration of single radial immune diffusion using Mancini's technique
6. Demonstration of double immune diffusion using Ouchterlony's method

**SEMESTER – IV ELECTIVE COURSE 1. ENTOMOLOGY: MORPHOLOGY AND
TAXONOMY
COURSE CODE ZY1924301**

- No changes were suggested as it meets national and international standards



SEMESTER – IV ELECTIVE COURSE 2. ENTOMOLOGY: ANATOMY AND
PHYSIOLOGY
COURSE CODE ZY1924302

Additions

Module 1

1. Chemistry of the cuticle
2. Anatomy and histology **changed to** Organization and structure of tracheal system
3. Modifications of respiratory system **changed to** Movement of gases within the tracheal system
4. Salt and water balance- terrestrial, freshwater, brackish water and salt water (Mention Hormonal control)

Module 2

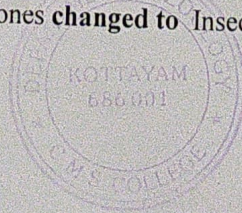
1. Absorption of food, Metabolism of insecticides, Diapause as a metabolic process
2. Anatomy and histology **changed to** Structure of insect circulatory system, Heart beat and its regulation- cardio acceleratory peptides, Immune mechanisms in insects- cell mediated and humoral immunity Transferrin, Dscam- short notes
3. Structure of fat body changed to Fat body- structure and development, Storage and utilization of energy and nutrients
4. Gas exchange in aquatic insects: closed and open tracheal system
5. Gas exchange in endo-parasitic insects and in insect eggs
6. Flight metabolism

Module 3

1. Histo-morphology changed to Structure of muscle
2. Physiology of neuromuscular junction

Module 4

1. Anatomy and histology of brain, ganglia and nerves **changed to** Basic components and anatomy of nervous system
2. Physiology of Chemoreception, Photoreception- Form and Movement Perception, Distance perception Spectral Sensitivity and Colour vision
3. Sensitivity to polarized light
4. Histomorphology of neurosecretory cells **changed to** Endocrine organs- corpora cardiac, corpora allata, moult glands and prothoracic glands
5. Regulation of hormone titre
6. Types of pheromones and behavioural patterns. Pheromonal communications- allelochemicals; allomones, kairomones and synomones **changed to** Insect



semiochemicals and communication- Pheromones (types), kairomones, synomones,
Environmental, neural and Endocrine interaction

Module 5

1. No changes but hours increased to 5

Deletions

Module I

1. Role of hormones in moulting and sclerotisation—as functions of hormones to be studied in module 4
2. Cyclic release of CO₂, cutaneous respiration
3. Absorption of water and ions, reabsorption of essential materials.

Module 2

1. Assimilation (DS)
2. Control of heart beat
3. Role of fat body in storage of reserves

Module 4

1. Anatomy and histology of mechanoreceptors, photoreceptors and chemoreceptors- replaced by relevant topics
2. Sound production and light production--- in Morphology and taxonomy paper

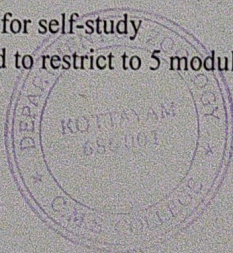
BOS recommendations

- Module 2 name to be changed to include all units
- Module 4 name to be changed to Insects coordination and communication
- References upgrade

SEMESTER – IV ELECTIVE COURSE 3. APPLIED ENTOMOLOGY COURSE CODE ZY1924303

Additions

1. Modifications were made to the topic on biological control, IGR's and Forensic entomology
2. In addition to that additions were made in such a way that pests were named under each crop.
3. The pest studied in the degree classes were kept for self-study.
4. Updates were made for references
5. Apiculture is a topic in degree class so it is kept for self-study
6. Modules given in previous syllabus is rearranged to restrict to 5 modules



**SEMESTER – IV ELECTIVE COURSE 4. VECTOR AND VECTOR BORNE DISEASES
COURSE CODE ZY1924304**

- Newly introduced course. The course was designed and prepared by a team of faculty members. It contains five modules and three credits. The following suggestions were made by the BoS.

Additions

1. Myiasis causing flies
2. Brief account of Black flies
3. Ctenocephalides

Deletions

1. Modules were rearranged as suggested by the BoS

**SEMESTER – IV PRACTICAL V. ENTOMOLOGY: MORPHOLOGY, TAXONOMY
AND ANATOMY
COURSE CODE ZY1924701**

Additions

- Identify the insect up to family using the key

**SEMESTER – IV PRACTICAL VI. INSECT PHYSIOLOGY, VECTOR AND VECTOR
BORNE DISEASE, INSECT TOXICOLOGY & APPLIED ENTOMOLOGY
COURSE CODE ZY1924702**

Additions

Introduced new practical for choice based core elective course -Insect toxicology such as

1. Determine the LD 50 in insect for contact and fumigant toxicity of essential oil at various concentration and time intervals
2. Symptoms and signs shown by insects due to the toxic effect of different types of insecticides
3. Statistical problems to calculate LD 50

New practical based on beneficial insects and their economic importance were added:

1. Honey bees and bee products
2. Silkworm moth-life cycle stages, silk fibre
3. Lac insect and stick lac or shellac.
4. Identification of different species of silkworm in India.
5. Study of moutages: Chandrika, Natrika
6. Study of diseases of silk worms: pebrine, flachery, grasserie, muscardine



The course in Zoology were proposed to be incorporated with the following components:

- Addressing the advances in research and technological infrastructure and to train the students about the scientific advances and discoveries
- Due significance to be given to incorporate local, national, regional and global developmental needs in the curriculum
- The existing courses to be streamlined with focus on Employability, Entrepreneurship and Skill development
- Facilitate the courses, by signing MoU's in order to collaborate with organizations relating to the discipline that would be helpful to the students
- Sensitise students by incorporating aspects like Gender, Environment, Sustainable living, Human values and Professional Ethics in the curriculum

Agenda Item No. 2. Approval to include model question paper and blue print

The meeting decided to include model question paper and question paper blue print along with the syllabus.

Agenda Item No. 3. Approval of list of experts to be involved in question paper setting and evaluation

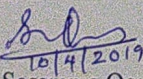
The meeting approved the list of teachers and experts to be involved in question paper setting and evaluation as presented by the chairperson.

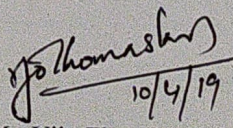
Item 4. Any other matters

Nil

Dr. Jobin Mathew thanked all the members of BoS for their wholehearted cooperation and the meeting came to an end at 5 pm.

Read and confirmed


10/4/2019
Dr. Sosamma Oommen
(Chairman)


10/4/19
Mr. Vijo Thomas Kurien
(Member Secretary)

Kottayam
10.4.2019

