SYLLABUS & PROGRAMME STRUCTURE

Zoology

(Honours)

(Choice Based Credit System)

(Effective from the Academic Session 2017-2018)

Fourth Semester

MAHARAJA BIR BIKRAM UNIVERSITY
AGARTALA, TRIPURA: 799004

PROGRAMME STRUCTURE

Structure of Proposed CBCS Syllabus B.A/B.Sc/B.Com Honours.

Semester	Core Course (14) Honours	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (2)	Discipline Specific Elective (DSE) (4)	Generic Elective (GE) (4)
1	**C1** **C2**	**AECC1: Environmental Science**			**GE1** (Paper-I of selected subject other than Hons subject)
2	**C3** **C4**	**AECC2 : (English/MIL (Communication)**			**GE2** (Paper-II of selected subject other than Hons subject)
3	**C5** **C6** **C7**		**SEC1**		**GE3** (Paper-III of selected subject other than Hons subject)
4	**C8** **C9** **C10**		**SEC2**		**GE4** (Paper-IV of selected subject other than Hons subject)
5	**C11** **C12**			**DSE1** **DSE2**	
6	**C13** **C14**			**DSE3** **DSE4**	

Semester-IV
Core Course - Paper –VIII
COMPARATIVE ANATOMY OF VERTEBRATES

TOTAL MARKS – 100

[Theory – (60+10), Practical – (20+10)]

THEORY

Credits: 04

Unit-I

Integumentary & Skeletal Systems:

a) Structure, functions and derivatives of integument.
b) Axial and appendicular skeletons of Birds (Pigeon) & Mammals (Guinea Pig).
c) Definition types and function with reference to mammalian teeth.

Unit-II

Digestive & Repository Systems:

a) Structural organization of Alimentary canal and associated glands with reference to one Ruminant & one Non-ruminant mammals
b) General organization of gills, lungs and air sacs,
c) Accessory respiratory organs of Geol fishes (*Monopterus or Amhipnous, Anabas, Clarias, Heteropneustes, Ophiocephalus*).

Unit-III

Circulatory & Urinogenital Systems:

a) General plan of circulation with reference to Single-circuit (Lates sp.) and Double-circuit (Guineapig) hearts.
b) Evolution of heart and aortic arches.
c) Evolution of urinogenital system in mammals.

Unit-IV

Nervous System & Sense Organs:

a) Comparative account of brain.
b) Autonomic nervous system, Spinal cord and Cranial nerves in mammals.
c) Classification of receptors, Function of Visual & Auditory receptors in man.

PRACTICAL

Credits: 02

1. Study of Placoid, Cycloid and Ctenoid scales through permanent slides/ photographs.
2. Disarticulated skeleton of Frog, Fowl/Pigeon and Rabbit/ Guinea pig.
3. Carapace and plastron of turtle/ tortoise.
4. Mammalian skulls: One herbivorous and one carnivorous animal.

NOTE: ***Assignment / Project preparation on any one of the followings (Internal Assessment only for evaluation of 10 marks including Interaction):***

1. Details on structure of any one organ (heart, lung, kidney, eye and ear) with Models, Drawings or Photographs.
2. Details on Skeletal modifications in Vertebrates with Drawings or Photographs.
3. Details on Accessory respiratory structures and functions of our known Geol fishes.

Suggested Readings:

1. ***Kardong, K.V. (2005)*** *Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education.*
2. ***Kent, G.C. and Carr R.K. (2000).*** *Comparative Anatomy of the Vertebrates. IX Edition, Tata McGraw – Hill Education.*
3. ***Weichert C.K and William Presch (1970).*** *Elements of Chordate Anatomy, Tata McGraw Hills.*
4. ***Hilderbrand, M and Gaslow G.E. (1998).*** *Analysis of Vertabrate Structure, 5th Edn. John Wiley and Sons.*
5. ***Walter, H.E. and Sayles, L.P (1949);*** *Biology of Vertebrates, McMillan, 6th Printing 1959.*

Semester-IV
Core Course - Paper –IX
ANIMAL PHYSIOLOGY: LIFE SUSTAINING SYSTEMS

TOTAL MARKS – 100

[Theory – (60+10), Practical – (20+10)]

THEORY

Credits: 04

Unit-I

Digestive Systems:

a) Histology and functions of gastrointestinal tract and its associated glands.
b) Mechanism of digestion of foodstuff and absorptions of carbohydrates, lipids and proteins.
c) Role of gastrointestinal hormones on secretion of enzymes in GIT.

Unit – II

Respiratory Systems:

a) Histology of lung; Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities.
b) Transport of oxygen and carbon dioxide in blood.
c) Respiratory pigments, Structure and functions of haemoglobin, Dissociation curves and the factors influencing it.

Unit – III

Excretory Systems:

a) Structure of kidney and its functional unit.
b) Mechanism of urine formation and its regulation.
c) Regulation of water balance & Regulation of acid-base balance.

Unit - IV

Physiology of Circulation:

a) Components of blood; Haemostasis and Haemopoiesis.
b) Structure of mammalian heart; Coronary circulation and structure of myocardial fibers.
c) Origin and conduction of cardiac impulses; Cardiac cycle; Cardiac output; Blood pressure and its regulation.

PRACTICAL

Credits - 02

1. Enumeration of red blood cells using Haemocytometer*
2. Estimation of Haemoglobin using Sahli's Haemoglobinometer*
3. Preparation of Haemin crystals.
4. Preparation of blood-film and identification of White blood cells.
5. Recording of blood pressure using a Sphygmomanometer*
6. Microscopic studies of Tissue sections (mammalian): Esophagus, Stomach, Duodenum, Ileum, Rectum, Liver, Lung and Kidney (any five available slides).

NOTE: ***Assignment/ Project preparation by every candidate on any one* of the followings (Internal Assessment only for evaluation of 10 Marks including Interaction):***

1. Enumeration of red blood cells using haemocytometer.
2. Estimation of haemoglobin using Sahli's haemoglobinometer.
3. Recording of blood pressure using a sphygmomanometer.

*** As decided by the Department/ concerned Teacher.**

Suggested Readings:

1. ***Guyton, A.C. & Hall, J.E. (2006).*** *Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd./ W.B. Saunders Company.*
2. ***Tortora, G.J. & Grabowski, S. (2006).*** *Principles of Anatomy & Physiology. Xi Edition John Wiley & sons.*
3. ***Victor P. Eroschenko. (2008).*** *diFiore's Atlas of Histology with Functional correlations. XII Edition. Lippincott W. & Wilkins.*
4. ***Arey, L.B. (1974).*** *Human Histology. IV Edition. W.B. Saunders.*
5. ***Mariano S.H. (1981).*** *di Fiore's Atlas of Human Histology, Lea & Febiger; 5th ed.*
6. ***Widmaier Eric P (2015).*** *Vander's Human Physiology: The Mechanisms of Body Function, 14th Edition, McGraw – Hill Education.*

Semester-IV
Core Course - Paper –X
BIOCHEMISTRY OF METABOLIC PROCESSES

TOTAL MARKS – 100

[Theory – (60+10), Practical – (20+10)]

THEORY

Credits: 04

Unit – I

Carbohydrate Metabolism:

a) Glycolysis, Glycogenolysis, Glycogenesis, Gluconeogenesis.
b) Citric acid cycle, Pentose phosphate pathway.
c) Shuttle systems (Malate-aspartate shuttle, Glycerol 3-phosphate shuttle).

Unit – II

Lipid Metabolism:

a) Triglycerides and steroids.
b) β-oxidation of saturated fatty acids with even and odd number of carbon atoms.
c) Biosynthesis of palmitic acid; Ketogenesis and its regulation.

Unit – III

Protein Metabolism:

a) Catabolism of amino acids: Transamination & Deamination.
b) Urea-Ornithine cycle and its significance.
c) Fate of C-skeleton of Glucogenic and Ketogenic amino acids.

Unit – IV

Intermediary metabolism & Oxidative Phosphorylation:

a) Inter-relationship of carbohydrates, lipid and protein metabolism.
b) Oxidative phosphorylation and ETS.
c) Role of ATP synthase, Inhibitors and Uncouplers.

PRACTICAL

Credits – 02

1. Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose) or Qualitative tests of functional groups in carbohydrates.
2. Quantitative Estimation of Glucose.
3. Colour tests of functional groups in protein solutions.
4. Study of enzyme activity (Pepsin, Trypsin).
5. Estimation of total protein in given solutions by Lowry's method. *

NOTE-1: ***Any three of the above mentioned Items (except No. 6) are to be practiced in Practical Classes.***

NOTE-2: ***Assignment/ Project preparation on Item-5 (Internal Assessment only for evaluation of 10 Marks including Interaction):*** *Estimation of total protein in given solutions by Lowry's method. **

Suggested Readings:

1. ***Cox, M.M and Nelson D.L. (2008).*** *Lehninger Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York. 21.*
2. ***Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007).*** *Biochemistry, VI Edition, W.H. Freeman and Co., New York.*
3. ***Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009).*** *Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw – Hill Companies Inc.*
4. ***Hames, B.D. and Hooper, N.M. (2000).*** *Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K.*

SYLLABUS & PROGRAMME STRUCTURE

Skill Enhancement Course
(SEC)

Zoology
(Honours)

(Choice Based Credit System)

(Effective from the Academic Session 2017-2018)

Fourth Semester

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SEMESTER - IV
SEC – II (Honours)
PROJECT WORK ON SERICULTURE

FULL MARKS - 100

Credits - 02

Unit – I

Introduction & Biology of Silkworm:

a) Sericulture: Definition, history and present status; Silk route.
b) Types of silkworms, Distribution and Races, Exotic and indigenous races.
c) Mulberry and non-mulberry Sericulture, Life cycle of *Bombyx mori,* Structure of Silk gland and Secretion of silk.

Unit – II

Rearing of Silkworms:

a) Selection of mulberry variety and establishment of mulberry garden.
b) Rearing house and rearing appliances, Uses of Disinfectants: Formalin, bleaching powder, RKO, etc.
c) Silkworm rearing technology: Early age and Late age rearing, Spinning, harvesting and storage of cocoons.

Unit – III

Pests and Diseases:

a) Pests of silkworm: Uzi fly, dermestid beetles and vertebrates.
b) Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial.
c) Control and prevention of pests and diseases.

Unit – IV

Entrepreneurship in Sericulture:

a) Prospectus of Sericulture in India: Sericulture industry in different states.
b) Employment, potential in mulberry and non-mulberry sericulture.
c) Visit to various sericulture centres.

Suggested Readings:

1. ***Ullal, S.R. and M.N. Narasimhanna (1978).*** *Handbook of Practical Sericulture: CSB, Bangalore, India.*
2. ***Jolly, M.S. (1987)*** *(Editor). Appropriate Sericultural Techniques; Ed. Director, CSR & TI, Mysore, India.*
3. ***Ayuzawa, C., Sekido, D., Yamakawa, K., Sakurai, U., Kurato, W., Yaginuma Y. and Takoro (1972).*** *Handbook of Silkworm Rearing: Agriculture and Technical Manual – 1, Fuzi Pub. Co. Ltd., Tokyo, Japan. 1972.*
4. ***Narasimhanna, M.N. (1988).*** *Manual of Silkworm Egg Production; CSB, Bangalore, India.*
5. ***Wupang-Chun and Chen Da-Chung (1988).*** *Silkworm Rearing; Pub. By FAO, Rome, Italy.*
6. ***Sengupta, K. (1989).*** *A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore, India.*
7. ***Krishnaswamy, S. (1986).*** *Improved Method of Rearing Young age silkworm; reprinted CSB, Bangalore, India.*

SEC: General Information:

- Skill Enhancement Course (SEC) is an integral component of both Honours and General Programmes across the Streams under UGC CBCS UG Syllabi.
- SEC-1 of each Subject will consist of diverse topics/themes the Earlier Semesters and similarly SEC-2 of each Subject will consist of diverse topics/themes related to the Later Semesters.
- Topics/Themes must be incorporated in each of two Syllabi of SEC meant for Project & Assignments corresponding to CBCS Honours & General/Pass Programmes. PROJECTS & Assignments should be guided in such a way that all Projects/Assignments are prepared by students on different titles & aspects/dimensions of topics/themes/issues incorporated in University approved SEC Syllabi.
- SEC will represent a well mentored and self prepared Project work in written form by a student on respective Syllabi or 5 Assignments in terms of systematic answers in written form against a broad type of question/query carrying 20 marks each applicable across all Streams & Programmes. In case of Science Faculty, Assignments may be on Practical issues/topics/experiments.

SEC: Distribution across Streams & Programmes :

- One Paper of SEC finds its place in each of Third and Fourth Semesters under **Honours Curricula across the Arts/Science/ Commerce Streams** comprising altogether two Papers. In this case SEC must relate to the Honours Subjects only.
- One Paper of SEC finds its place in each of Third to Sixth Semesters under **Arts General Programmes** comprising altogether four papers. Two Papers of SEC will be associated with first Elective Subject and two Papers of SEC will be associated with second Elective Subject (as per sequence of filling up Elective Subjects in the admission forms or preference of the candidate submitted otherwise) in case of Arts (General)Programmes. Across the Third to Sixth Semesters a candidate will take SEC in the sequence : SEC(First Elective, First Paper) or SEC-11, SEC (Second Elective, First Paper) or SEC-21, SEC(First Elective, Second Paper) or SEC-12 & SEC (Second Elective, Second Paper) or SEC-22 respectively.
- For **Science (General) Programme** 4 Papers of SEC will be tagged with at least two out of three Electives and the highest number of SEC Papers under a given Elective must not be more than two.
- The Commerce Department will conduct the SEC in the relevant themes/ topics/issues related to the respective SEC Syllabi: 2 Papers for Honours & 4 Papers for **Commerce (General) Programmes** structurally distributed as like as Arts.
- Same sub topic/theme cannot be opted by a given candidate/student in preparation of Project/ Assignments at different Semesters under SEC .

SEC: Assessment of Project/Assignments :

- Assessment of SEC will be made on Evaluation of the Written Form of Project Work consisting of 80 marks and Oral Interaction /Feedback with the students on Project / Theme consisting of 20 marks.
- A Project must consist of the following 6 Chapters:
  1. Introduction,
  2. Basic Concepts,
  3. Main Analysis on the selected Theme/ Theory,
  4. Supplementary or Complimentary Analysis to the Main Theme/Theory,
  5. Self Study Report & Conclusion ,
  6. List of References of Books & Other Materials.
- The Project & Assignment will follow the University approved Syllabi materials on Subject & Paper specific topics/themes/issues.
- The Project must consist of all the basic features including Cover Page, Preface, Certification by Guide and Contents etc. apart from Chapterisation.
- The word limits of a Project will be in between 2500 to 3500 and the word limits of an Assignment will be in between 400 to 500.
- 80 Marks on written form of Projects will be assessed as per the following format:

Assessment Profile of a Project		
Sl. No.	**Assessment Aspects**	**Assigned Marks**
01	Nature of Project Theme & Chapterisation	20
02	Topical Coverage & Consistency of Analysis.	20
03	Way of Presentation & Technical Elements	20
04	Academic Quality & Excellence.	20
	Marks on Project Presentation:	80
	Marks on Oral Feedback :	20
	Total Marks on Project :	100

- Both the evaluated/ assessed Projects and bunch of Assignments will remain under the custody of the related Departments and the University may ask for the despatch of the Projects or bunch of Assignments as & when necessitated.
- The total marks on Projects or Assignments will have to be transmitted by the College to the University on or before the stipulated date.
- This is a general guideline. The respective department(s) may incorporate or modify as department(s) deem fit.