CBCS SYLLABUS

For

Three Years Under-Graduate Course

in

B.Sc General Degree Course in Zoology (*w.e.f.2022-23*)

BANKURA UNIVERSITY

BANKURA

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CONTENTS

Introduction

The syllabus for Zoology at undergraduate level using the Choice Based Credit system has been framed in compliance with model syllabus given by UGC. While framing the syllabus as per the UGC guideline, the topics have been kept as generic as possible in order to provide enough freedom to the individual Universities to detail out their own syllabus as per their own infrastructure, expertise and strength.

The main objective of framing this new syllabus is to give the students a holistic understanding of the subject giving substantial weightage to both the core content and techniques used in Zoology.

Keeping in mind and in tune with the changing nature of the subject, adequate emphasis has been given on new techniques and understanding of the subject.

The syllabus has also been framed in such a way that the basic skills of subject are taught to the students, and everyone might not need to go for higher studies and the scope of securing a job after graduation will increase.

There is wide deviation in the infrastructure, be it physical or in human resource, in the form of teachers' expertise and ability and aspiration of the students. Hence, University is free to choose the Electives as per their infrastructural strengths and offer at least 6 to 7 electives

While the syllabus is in compliance with UGC model curriculum, it is necessary that Zoology students should learn "Immunology" as one of the core courses rather than as elective while. Also, an important elective on "Microbiology" has been added.

Scheme for CBCS Curriculum

2.1 Credit Distribution across Courses

Course Type	Number of Courses	Credits		
		Theory	Practical	Theory + Practical
Core course (CC)	12 Papers (Four Papers each in 3 Disciplines of Choice)	4X12=48	2 X12 = 24	72
Discipline Specific Elective Subject (DSE)	6 Papers (Two Papers each in 3 Disciplines of Choice	4X06=24	2 X 06=12	36
Ability Enhancement Compulsory Course (AECC)	2 Papers (Compulsory Language Paper & Environmental Studies)	4X1=4 2X1=2		6
Skill Enhancement Course (SEC)	4 Papers	4X2=8		8
Total		86	36	122

2.2 Summary Scheme for CBCS Curriculum

Core Courses	
CC-1A: Animal Diversity	CC-1C: Physiology and Biochemistry
CC-1B: Comparative anatomy and Developmental Biology of Vertebrates	CC-1C: Genetics and Evolutionary Biology
Discipline Specific Elective (DSE)	
DSE1a:Applied Zoology or 1bInsect Vector and Disease	DSE2a:AquaticBiology or 2b :Immunology
Skill Enhancement Courses (SEC)	
SEC1:Apiculture	SEC2:Aquarium Fish Keeping
SEC3:Sericulture	SEC4: Medical Techniques

2.3 Question patterns for Zoology

For 25 Marks

Sl No.	Questions to be answered	Out of	Marks of each question	Total Marks
1	5	8	1	5 x1=5
2	2	4	5	2 x 5=10
3	1	2	10	1 x 10= 10

For 40 Marks

Sl No.	Questions to be answered	Out of	Marks of each question	Total Marks
1	5	8	2	5 x2=10
2	4	6	5	4x 5=20
3	1	2	10	1 x 10= 10

2.4 Scheme for CBCS Curriculum in Zoology (General)

SEMESTER–I

CourseCode	CourseTitle	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/SC/101/C-1A	**Animal Diversity**	6	10	40	50		25	15
UGP/102/C-2A	Discipline-2	6	10	40	50			
UGP/103/C-3A	Discipline-3	6	10	40	50			
UG/ 104/AECC-ENV	Environmental Studies	4	10	40	50			
Total in Semester-I		**22**	**40**	**160**	**200**			

SEMESTER –II

Course Code	Course Title	Credit	Marks			No .of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/S.C./201/C-1B	**Comparative anatomy and Developmental Biology of Vertebrate**	6	10	40	50		25	15
UGP/202/C-2B	Discipline-2	6	10	40	50			
UGP/203/C-3B	Discipline-3	6	10	40	50			
UG/204/AECC-E/MIL	English/MIL	2	10	40	50			
Total in Semester-II		**20**	**40**	**160**	**200**			

SEMESTER – III

Course Code	Course Title	Credit	Marks			No .of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/S.C./301/C-1C	**Physiology and Biochemistry**	6	10	40	50		25	15
UGP/302/C-2C	Discipline-2	6	10	40	50			
UGP/303/C-3C	Discipline-3	6	10	40	50			
UGP/S.C/304/SEC-1	**Apiculture (Economic Zoology)**	2	10	40	50			
Total in Semester-III		**20**	**40**	**160**	**200**			

SEMESTER – IV

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/S.C./401/ C-1D	**Genetics and Evolutionary Biology**	6	10	40	50		25	15
UGP/402/C-2D	Discipline-2	6	10	40	50			
UGP/403/C-3D	Discipline-3	6	10	40	50			
UGP/S.C./404/SEC-2	**Aquarium Fish Keeping**(Economic Zoology)	2	10	40	50			
Total in Semester-IV		**20**	**40**	**160**	**200**			

SEMESTER – V

Course Code	Course Title	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/S.C./501/DSE-1A	**DSE T1a Applied Zoology or** **1bInsect vector and Disease** **DSE P1a Applied Zoology Lab or** **1b Insect vector and Disease**	6	10	40	50		25	15
UGP/502/DSE-2A	Discipline-2	6	10	40	50			
UGP/503/DSE-3A	Discipline-3	6	10	40	50			
UGP/S.C./504/SEC-3	**Sericulture (Economic Zoology)**	2	10	40	50			
Total in Semester–V		**20**	**40**	**160**	**200**			

SEMESTER – VI

Course Code	CourseTitle	Credit	Marks			No. of Hours		
			I.A.	ESE	Total	Lec.	Tu.	Pr.
UGP/S.C./601/DSE-1B	**DSE T2a Aquatic biologyor** **2b Immunology** **DSEP 2a Aquatic biology Lab or** **2b Immunology Lab**	6	10	40	50		25	15
UGP/602/DSE-2B	Discipline-2	6	10	40	50			
UGP/603/DSE-3B	Discipline-3	6	10	40	50			
UGP/S.C./604/SEC-4	**Medical Techniques**	2	10	40	50			
Total in Semester–VI		**20**	**40**	**160**	**200**			

UGP= Under Graduate programme/Pass, S.C.= Subject Code C= Core Course, E/H/MIL= English/ Hindi/ Modern Indian Language, H/MIL/E= Hindi/ Modern Indian Language/ English, AECC-E= Ability Enhancement Compulsory Course-English, AECC-ENV= Ability Enhancement Compulsory Course-Environmental Science, SEC= Skill Enhancement Course, GE= Generic Elective, DSE= Discipline Specific Elective IA= Internal Assessment, ESE= End-SemesterExamination,Lec.=Lecture,Tu.=Tutorial,andPr.=Practical

2.5 Odd Semester Course ID

Semester	Course ID Internal	Course ID Theory	Course ID Practical	Paper Type	Course Title	Course code	Credit	Theory Marks	Practical marks
Sem –I	12608	12618	12628	DSC- 1 A	Animal Diversity	SP/ZOO/101/C-1A	4 2	25	15
Sem –III	32608	32618	32628	DSC- 1 C	Physiology and Biochemistry	SPZOO/ 301/C-1C	4 2	25	15
	32600	32610	***	SEC-1(P)	Apiculture (Economic Zoology)	SPZOO /304/ SEC-1	2	40	**
Sem –V	52608	52618	52628	DSE-1A	Applied Zoology	SPZOO/501/DSE-1A	4 2	25	15
	52608	52618	52628	DSE-1A	Insect Vector and Disease	SPZOO/501/DSE-1A	4 2	25	15
	52600	52610	***	SEC-3 (P)	Sericulture (Economic Zoology)	SPZOO/504/SEC-3	2	40	**

2.6Even Semester Course ID

Semester	Course ID Internal	Course ID Theory	Course ID Practical	Paper Type	Course Title	Course code	Credit	Theory Marks	Practical marks
Sem –II	22608	22618	22628	DSC-1B	Comparative anatomy and Developmental Biology of Vertebrate	SP/ZOO/201/C-1B	4 2	25	15
Sem –IV	42608	42618	42628	DSC-1D	Genetics and Evolutionary Biology	SPZOO/ 401/C-1D	4 2	25	15
	42600	42610	***	SEC-2	Aquarium Fish Keeping (Economic Zoology)	SPZOO /404/ SEC-2	2	40	***
Sem –VI	62608	62618	62628	DSE-1B	Aquatic Biology	SPZOO/601/DSE-1B	4 2	25	15
	62608	62618	62628	DSE-1B	Immunology	SPZOO/601/DSE-1B	4 2	25	15
	62600	62610	***	SEC-4	Medical Techniques	SPZOO/604/SEC-4	2	40	***

Semester -I

3.Core Subjects Syllabus

3.1 CoreT1-Animal Diversity 4 Credits

Course outcomes:
The course considers a diverse range of chapters of Animal Diversity, through which students will be able to get the information on a wide range of fauna and will help them to learn their salient features and some basic structural organization with taxonomic details.

Theory

Unit-1Sub-Kingdom Protozoa
1. General characters and classification of Subkingdom Protozoa up to Phylum (Levine etal., 1980)
2. Locomotory Organelles and locomotion in Protozoa (Pseudopodia, Cilia, Flagella)

Unit-2 Phylum Porifera
1. General characters and classification up to classes (Hyman)
2. Canal System in *Sycon*

Unit-3 Phylum Cnidaria
1. General characters and classification up to classes
2. Polymorphism in *Siphonophora*

Unit-4 Phylum Platyhelminthes
1. General characters and classification up to classes
2. Life history of *Taeniasolium*

Unit-5 Phylum Nematoda
1. General characters and classification up to classes
2. Life history of *Ascaris lumbricoides*

Unit-6 Phylum Annelida
1. General characters and classification up to classes;
2. Nephridia in annelids

Unit-7 Phylum Arthropoda
1. General characters and classification up to classes
2. Metamorphosis in insects

Unit-8 Phylum Mollusca
1. General characters and classification up to classes
2. Torsion in gastropods.

Unit-9 Phylum Echinodermata
1. General characters and classification up to classes
2. Water-vascular system in *Asterias*

Unit-10 Phylum Hemichordata
1. General features
2. Affinities of *Balanoglossus*.

Unit-11 Phylum Urochordata
1. General features
2. Retrogressive metamorphosis in Ascidia

Unit-12 Phylum Cephalochordata

1. General features
2. Filter feeding in *Branchiostoma*

Unit-13Series Pisces

1. General features and Classification up to Sub classes (Romer,1959)
2. Osmoregulation in fishes

Unit-14 Clasas Amphibia

1. General features and Classification up to living orders (Nobel 1924)
2. Metamorphosis in Toad

Unit-14 Class **Reptilia**

1. General features and Classification up to living Subclass (Young,1981)
2. Poisonous and non-poisonous snakes,

Unit-15 Class Aves

1. General features and Classification up to orders(Young, 1981)
2. Volant adaptations in birds

Unit-16 Class Mammalia

1. Classification up to Sub classes (Young, 1981)
2. Dentition in mammals

Note:

Classification of Unit3-9 to be followed from—Ruppert &Barnes, (1994), Invertebrate Zoology, VI Edition

Suggested Readings [Consult Latest Editions]

1. Arora, M.P.*ChordataI. Himalaya Pub House*
2. Barnes, R. D. & Ruppert, E. E., (1994). Invertebrate Zoology. 6th Ed. Brooks Cole.
3. Chatterjee, A & Chakraborty C.S. Approach to a Text Book of Zoology Nirmala Library, Kolkata.
4. Dhami P.S and J.K. Dhami– Invertebrate Zoology – S.Chand and Co.
5. Jordan, E. L. & Verma, P. S. (2006). Invertebrate Zoology& Chordate Zoology.S. Chand & Company Ltd. New Delhi.
6. Kotpal, R.L., 1988– 1992. (AllSeries) Protozoa, Porifera, Coelentereta, Annelida, Arthropoda, Mollusca, Echinodermata,–Rastogi Publications, Meerut– 250 002.
7. Romer, A.S.& Parsons,T.S.(1986).The vertebrate body. 6th Ed. Saunders College Pub.
8. Ruppert E. E.,Fox ,R. &Barnes R. D. (2003). Invertebrate Zoology: a Functional Evolutionary Approach. 7th Ed. Brooks Cole.
9. Chattopadhyay D, (2019). Elementary Chordate Zoology, Book Syndicate (P) Ltd. Kolkata.
10. Patri M, (2021). Comparative anatomy of vertebrates Kalyani Publishers. Delhi.
11. Bhattacharyya I K & Mahanta R,(2017). New College Zoology (Vol I). Kalyani Publishers. Delhi.
12. ডঃ তাপস দেব ও ডঃ সুমিত গিরি (২০২২), স্নাতক প্রাণীবিদ্যা (Semester -1).Santra Publication, Kolkata
13. ডঃ দেবজ্যোতি চট্টোপাধ্যায় (২০১৯), স্নাতক প্রাণীবিদ্যা-১. Book Syndicate (P) Ltd. Kolkata
14. ডঃ চন্দ্রশেখর চক্রবর্তী (২০২০), প্রাণিবিদ্যা. (Semester -1).নির্মলা লাইব্রেরী,কলকাতা

3.2 Animal Diversity Lab 2 Credits

Course outcome:
The course will allow them to learn on a wide range of Invertebrate and Vertebrate fauna and will help them to learn their salient features and some basic structural organization with taxonomic details.

Practicals

1. Spot identification of the following specimens (Non chordates):
   Amoeba,Euglena,Paramecium,Sycon,Euspongia,Obelia,Physalia,Aurelia,Tubipora,Taenia,Ascaris, Aphrodite,NereisPheretima,,Palaemon,Limulus,Scolopendra,Julus,,Chiton,Dentalium,Unio,Loligo, Ophiura, Echinus, Cucumaria, Balanoglossus,

2. Spot identification ofthe following specimens (Chordates):
   Branchiostoma,Petromyzon,Torpedo,Labeo,Exocoetus,Ichthyophis,Salamandra,Hyla,Chelone,Chamaeleon, Draco, Naja, Passer, Alcedo, Pteropus,Funambulus,Bandicota

3. Submission of a Project Report on 'animal album" containing photographs, cut outs, with appropriate write up about any above mentioned taxa/Different taxa/topics may be given to different sets of students for this purpose

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Distribution of Marks

Examination Pattern	**Full marks: 15**
1.Spot identification (6 fromItem1and 2; 3 each from non-chordate & chordate)	(6 ×1½)= 09
2.Submission of a project report	= 4
3.Submission of laboratory notebook:	=2

Note:Q1. For Item (1),½mark for Sc. name and 1 mark for systematic position

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology, New Central Book Agency, Kolkata
3. Sinha, J.K. , Chatterjee, A.K. and P. Chattopadhyay Advanced Practical Zoology

Semester -II

3.3 Core T2 –Comparative anatomy and Developmental Biology of Vertebrate 4 Credits

Course outcomes:
The course considers a diverse range of chapters of Comparative anatomy and Developmental Biology of Vertebrate, through which students will be able together in formation on the fundamental concepts in these subjects.

Theory

Unit1: Integumentary System
Derivatives of integument with reference to Scales in fishes, feathers in birds, Horn & Antlers in mammals

Unit2: Skeletal System
Evolution of visceral arches

Unit3: Digestive System
Brief account of alimentary canal and digestive glands

Unit4: Respiratory System
Brief account of Gills, lung and, air sacs

Unit5: Circulatory System
Evolution of heart and aortic arches

Unit6: Urinogenital System
Evolution of Kidney (Pro, meso and meta nephric)

Unit7: Nervous System
Comparative account of brain

Unit8: Sense Organs
Types of receptors

Unit9:Early Embryonic Development
Spermatogenesis and oogenesis with reference to mammals, Fertilization: external (amphibians), internal(mammals), patterns of cleavage, fate map and gastrulation in frog embryo.

Unit10:Late Embryonic Development
Types of Placenta and their function; Placenta formation in Human.

Unit11:Control of Development
Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, cell movements and cell death.

Suggested Readings:

1.Carlson, Bruce M(1996). Patten's Foundations of Embryology, McGraw Hill, Inc.
2.Gilbert, S.F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
3.Hilderbrand, M and Gaslow G.E.Analysis of Vertebrate Structure, John Wiley and Sons.
4.Jordon & Verma. Chordate Embryology S. Chand Pub. New Delhi.
5.Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education.
6.Kent, G.C. and Carr R.K. (2000).Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
7.Saxena,R.A.&Saxena,S. Comperative Anatomy of Vertebrates. Viva Publication.
8.Walter, H.E. and Sayles, L.P; Biologyof Vertebrates, Khosla Publishing House.
9.ডঃ তাপস দেব ও ডঃ সুমিত গিরি (২০২২), স্নাতক প্রাণীবিদ্যা (Semester -I1).Santra Publication,Kolkata
10. ডঃ চন্দ্রশেখর চক্রবর্তী (২০২০), প্রাণিবিদ্যা. (Semester -II). নির্মলা লাইব্রেরী,কলকাতা
11.ডঃ দেবজ্যোতি চট্টোপাধ্যায় (২০১৯), স্নাতক প্রাণীবিদ্যা-২. Book Syndicate(P) Ltd. Kolkata

3.4 Core P2Comparative anatomy and Developmental Biology of Vertebrate Lab 2Credits

Course outcomes:
This course will enable to learn on identifying limb and girdles bones of different vertebrates. Embryonic developmental stages of birds are included in the syllabus to have an idea of chick embryos development.

Practical

1. Osteology: Identification of
   a) limb bones and girdles of *Columba* and *Cavia*
   b) Carapace and plastron of turtle (model/photograph)
   c) Mammalian skulls: Guinea pig and Dog.
2. Identification of whole mounts of developmental stages of chick through permanent slides:24 and 48hours of incubation.
3. Identification of different sections of placenta (epitheliochorial, endotheliochorial and hemochorial) (photomicrograph/slides).
4. Submission of laboratory notebook

Distribution of marks	**Full Marks:15**
1. Spot identification (any four fromitem1)	(4x2)= 8
2. Spot identification (any two; one from item 2&3)	(2x2½)) = 05
3. Submission of laboratory note book	-= 2

Note:Q1.½ mark for identification and 1 ½ mark for reasons.
Q2. 1 mark for identification and 1 ½ mark for reasons.

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology, New Central Book Agency, Kolkata
3. Sinha, J.K. , Chatterjee, A.K.and P. Chattopadhyay Advanced Practical Zoology

Semester -III

3.5CoreT3–Physiology and Biochemistry 4 Credits

Course outcomes:
This course provides knowledge on basic principles of physiology and biochemistry including digestion, excretion, reproduction, neuroscience, metabolism as well as the basic understanding of enzyme function.

Theory

Unit1:Digestion
Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids

Unit2:Respiration
Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and Carbon dioxide in blood

Unit3: Cardiovascular system
Structure of Heart, Cardiac cycle, Composition of blood, Blood Coagulation

Unit4:Excretion
Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism

Unit5:Nerve and muscle
Structure of neuron, resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres, Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction

Unit6:Reproduction and Endocrine Glands
Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of Pituitary, Thyroid, Pancreas and Adrenal gland

Unit7:Carbohydrate Metabolism
Glycolysis, Krebs Cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism, Electron transport chain

Unit8:Lipid Metabolism
β oxidation of palmitic acid

Unit9:Protein metabolism
Transamination, Deamination and Urea Cycle

Unit10:Enzymes
Introduction, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation

Suggested Readings:

1.Berg,J. M., Tymoczko, J. L. and Stryer, L.(2006). Biochemistry. VI Edn. W.H Freeman & Co.
2.Chatterjea, MN and Shinde,R (2012) .A Textbook of Medical Biochemistry. 8thEdn.Jaypee Pub., N. Delhi
3.Das, D.(200). Biochemistry. CentralBook Agency, Kolkata
4.Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XIIEdition, Harcourt Asia Pvt. Ltd/ W.B.Saunders Company
5.Murray,R.K.,Granner,D.K.,Mayes,P.A.andRodwell,V.W.(2009).Harper'sIllustratedBiochemistry.XXVIIIEdition.LangeMedical Books/Mc Graw3Hill.
6.Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman andCo.
7.Sathyanarayana U. and Chakrapani,(2002). Biochemistry–Books & Allied (P)Ltd, Kolkata
8.Sembulingam and Sembulingam (2012)Essentials of Medical Physiology. 6th Edn.Jaypee Pub, New Delhi
9.Sherwood, L.(2013).Human Physiology from cells to systems. 8th Edn.,Brooks & Cole
10.Tortora,G.J.and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
11.ডঃ দেবজ্যোতি চট্টোপাধ্যায় (২০১৯), স্নাতক প্রাণীবিদ্যা-৩, Book Syndicate (P) Ltd. Kolkata

3.6CoreP3–Physiology and Biochemistry Lab 2 Credits

Course outcomes:
This practical course on Biochemistry will enable students to learn a number of experimental techniques like qualitative test of functional groups in biological macromolecules, quantitative estimation of protein, as well as estimation of enzymatic activity.

List of Practical

1. Preparation of haemin crystals
2. Identification of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland
3. Identification of permanent slides / photomicrograph of spinal cord, liver, lung, kidney, Cartilage, Bone
4. Qualitative tests for Glucose (Benedict's test) and Sucrose (Iodine test)
5. Estimation of total protein (Lowry's method.)
6. Study of activity of amylase (Effect of Temperature)
7. Submission of Laboratory Note Book

Distribution of marks	**Full Marks:15**
1. One question on Qualitative test (Item No.4)	03
2. One question on quantitative test (FromItem5)	04
3. One Experiment (From Item no. 1 or .6)	03
4. Identification of histological section[(From Item No. 2and 3) any two	(2 x1½)= 03
5.Laboratory Note Book	02

Note:

Q1. Principle 1 marks and result 2 marks

Q2. Principle 1 marks and result 3 marks

Q3. Principle 1 marks and result 2 marks

Q4. ½ marks for identification and 1 mark for reasons each

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna, B. (2015): Practical Zoology, New Central Book Agency, Kolkata
3. Sinha, J.K. , Chatterjee, A.K. and P.Chattopadhyay Advanced Practical Zoology

Semester -IV

3.7 CoreT4 – Genetics and Evolutionary Biology Theory 4 Credits

Course outcomes:
The course provides basic knowledge of Genetics and Evolutionary Biology including principles of inheritance, extension of Mendelian Genetics, Linkage, Crossing Over and Chromosomal Mapping, Mutations, Sex Determination, Geological time scale, Lamarckism, Darwinism, Neo-Darwinism and Modern Synthetic Theory.

Theory

Unit1:IntroductiontoGenetics
Principles of Inheritance, Mendel's work on transmission of traits.

Unit2:Extension of Mendelian Genetics
Chromosome theory of inheritance, Incomplete dominance and co dominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, sex linked inheritance, Extra-chromosomal inheritance

Unit3: Linkage, Crossing Over and Chromosomal Mapping
Linkage and crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence.

Unit4: Mutations
ChromosomalMutations:Deletion,Duplication,Inversion,Translocation,AneuploidyandPolyploidy;Genemutations;InducedversusSpontaneous mutations;

Unit5:Sex Determination
Chromosomal mechanisms; dosage compensation in *Drosophila*.

Unit6:History of Life
Origin of Life, Geological time scale

Unit7: Introduction to Evolutionary Theories
Lamarckism, Darwinism, Neo-Darwinism, Modern Synthetic Theory

Unit8: Direct Evidences of Evolution
Types of fossils, fossilization, Dating of fossils, Evolution of man.

Unit9:Processes of Evolutionary Change
Speciation; Isolating Mechanisms; Modes of speciation (Allopatric, Sympatric) Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive),

Unit10: Species Concept
Biological, Typological and Evolutionary species concept (Advantages and Limitations)

Unit11:Macro-evolution
Macro-evolutionary Principles (example: Darwin's Finches); Basic understanding of Micro-evolution.

Unit12: Extinction
Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution, Anthropogenic extinction.

Suggested Readings:
1.Barton,N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. andPatel, N. H.(2007).Evolution. Cold Spring, HarbourLaboratory Press.
2.Brooker,R.J. (2012). Genetics L Analysis and Principles. 4th Edn .McGrawHill.

3.Chattopadhyay, S.(2012). Life: Evolution, Adaptation, Ethology.3rdEdn.Books and Allied, Kolkata.
4.Futuyma, D. J.(1997). Evolutionary Biology. Sinauer Associates.
5.Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Ed. Wiley India.
6.Griffiths ,A.J.F.,Wessler, S.R.,Lewontin ,R.C.and Carroll,S.B. (2010).Introduction toGenetic AnalysisWHFreeman.
7.Hall, B. K. and Hallgrimsson, B.(2008). Evolution. IVEdition. Jones and Bartlett Publishers
8.Hyde, D. (2009). Introduction to Genetic Principle. McGraw Hill.
9.Kardong, K. (2004). An Introduction to Biological Evolution. McGrawHill.
10.Klug, W.S., Cummings, M.R., Spencer, C.A. (2012).Concepts of Genetics. X Edition. Benjamin Cummings.
11.Pierce, B.A.(2013). Genetics Essebtials: Concepts and Connections. 2nd Edn. Freeman W.H.
12.Ridley, M. (2004).Evolution. III Edition. Blackwell Publishing
13.Russel, P.J. (2009). Genetics- A Molecular Approach. IIIEdition. Benjamin Cummings.
14.Snustad, D.P., Simmons, M.J. (2009).Principles of Genetics. V Edition. John Wiley and Sons Inc.
15.ডঃ দেবজ্যোতি চট্টোপাধ্যায় (২০২১), স্নাতক প্রাণীবিদ্যা-৪,Book Syndicate(P) Ltd. Kolkata

3.8 Core P4-Genetics and Evolutionary Biology Lab 2 Credits

Course outcomes:
This course will enable students to identify major group of fossils from models/ photographs, Normal karyotype of man, as well as karyotypes in Down, Klinefelter's, Turner, Cri -du-Chat syndromes. Chi square test is taught to verify different experimental results.

List of Practical

1. Identification of major group of fossils from models/ pictures (Petrified fossil, moulds, casts, carbon film, trace fossil)
2. Identification of Human Karyotypes(Normal karyotype, Down, Klinefelter's, Turner, Cri-du-Chat syndrome) from photograph
3. Identification of homology and analogy from suitable specimens/pictures,
4. Linkage maps based on Drosophila crosses
5. Identification of Mendelian Inheritance and gene interactions (Non Mendelian Inheritance) using suitable examples. Verify the results using Chi-square test
6. Submission of Laboratory Note Book

Distribution of marks **FullMarks:15**

1.Identificationwith reasons (any four from item1,2 and 3) [at least one from each group]	= 08 (4×2)
2. One question (From Item 4 or 5)	= 05
3.Laboratory Note Book	= 02

Note
Q 1.½ mark for identification and 1½ mark for reasons

Suggested Readings:
1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology, NewCentral Book Agency,Kolkata
3. Sinha, J.K. , Chatterjee, A.K. and P. Chattopadhyay Advanced Practical Zoology

Semester -V

4. Discipline Specific Elective Courses (DSE 1 and 2)

4.1 DSE T1-Applied Zoology 4Credits

Course outcomes:
The Applied Zoology course will enable students to study epidemiology of diseases, transmission, prevention and control of diseases, parasitic Protozoa, life history and pathogenicity of *Entamoeba histolytica, Plasmodium vivax* and *Trypanosoma gambiense*, insects of medical Importance e.t.c.

Theory

Unit1: Introduction to Host-parasite Relationship
Host, Definitive host, Intermediate host, Reservoir host, Parasitism, Mutualism, Commensalism, Zoonosis

Unit2: Epidemiology of Diseases
Transmission, Prevention and control of diseases: Tuberculosis, typhoid

Unit3: Rickettsiae and Spirochaetes
Brief account of *Rickettsia prowazekii,Borrelia recurrentis* and *Treponema pallidum*

Unit4:Parasitic Protozoa
Life history and pathogenicity of *Entamoeba histolytica, Plasmodium vivax* and *Trypanosoma gambiense*

Unit5:Parasitic Helminthes
Life history and pathogenicity of *Ancylostoma duodenale* and *Wuchereria bancrofti*

Unit6:Insects of Economic Importance
Biology, Control and damage caused by *Helicoverpa armigera*, *Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae*

Unit7: Insects of Medical Importance
Medical importance and control of *Pediculus*, *Anopheles,Culex ,Aedes,*

Unit8:Animal Husbandry
Types of Cattle breeds, Artificial insemination in cattle

Unit9:Poultry Farming
Principles of poultry breeding, Management of breeding stock and broilers, Deep litter system

Unit10:Fish Farming
Pond management, Composite fish culture, Induced breeding and transportation of fish seed

SUGGESTEDREADINGS

1. Arora, D.R andArora,B. (2001). *Medical Parasitology*. II Edition. CBS Publications and Distributors.
2. Atwal, A.S. (1986). *Agricultural Pests of India and South East Asia*, Kalyani Publishers.
3. Banerjee, G.C. (2018). Animal husbandry. Oxford and IBH
4. Chatterjee, K. D. (2009).Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors(P)Ltd
5 Dunham R.A.(2004). *Aquaculture and Fisheries Biotechnology Genetic Approache*s. CABI publications, U.K.
6. Hafez, E.S. E. (1962).*Reproduction in Farm Animals*. Lea & Fabiger Publisher
7. Paniker, C.K.J., Ghosh, S. [Ed}(2013). Paniker's Text Book of Medical Parasitology. Jaypee, New Delhi.
8. Parija, S.C. Text book of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition,All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi

09.Park, K. (2007). *PreventiveandSocialMedicine*. XVI Edition. B.B Publishers.

10.ডঃ তাপস দেব ও ডঃ সুমিত গিরি (২০২২), স্নাতক প্রাণীবিদ্যা (Semester –V & VI).Santra Publication,Kolkata

4.2DSE P1-Applied Zoology Lab 2Credits

Course outcomes:
The practical course will enable students to identify Plasmodium *vivax, Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale* and *Wuchereria bancrofti*, arthropod vectors associated with human diseases like Pediculus, Culex, Anopheles, Aedes, to study economic importance of *Nilaparvata lugens, Apion corchori, Scirpophaga incertulus, Sitophilus oryzae* and *Tribolium castaneum* and to prepare a Project report.

Practicals

1. Identification of *Plasmodium vivax*, *Entamoeba histolytica, Trypanosoma gambiense, Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
2. Identification of arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes*
3. Identification of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying feature and economic importance of *Nilaparvata lugens,Apion corchori, Scirpophaga incertulus, Sitophilus oryzae*
5. Visit to fish farm, poultry farm or animal breeding centre. Submission of visit report
6. Submission of laboratory notebook

Distribution of marks **FullMarks:15**

1. Identification with reasons (any 4fromItemNo. 1,2 and 3; at least one from each group)	(4× 2)	=8
2. Identification and economic importance (any two)from Item No. 4	(1 ½× 2)	= 3
3. Field Report (Item 5)		= 2
4.Laboratory Note Book		= 2

Note
Q 1.½ mark for identification and 1½ mark for reasons.
Q2½mark for identification and 1mark for economic importance

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna, B. (2015): Practical Zoology, New Central Book Agency, Kolkata
3. Sinha, J.K. , Chatterjee, A.K. and P. Chattopadhyay Advanced Practical Zoology

4.3DSET 2a-Insect Vectors and Diseases 4 Credits

Course outcomes:
This course will enable students know about concept of vectors as well as vectors of different vectors of insect order , various kinds of disease and its control measures.

Theory

Unit I: Introduction to Insects
General Features of Insects, Morphological features, Compound Eye, Types of antennae, Mouth parts with reference to feeding habits

Unit II: Concept of Vectors
Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Adaptations as vectors, Host Specificity

Unit III: Insects as Vectors
Outline Classification of Insecta upto Order, Characteristic features of Order Diptera, Siphonoptera, Sipunculata,Hemiptera

Unit IV: Dipteran as Disease Vectors
Dipterans as vectors–Mosquitoes, Sand fly, Houseflies; Study of mosquito-borne diseases–Malaria, Dengue,Chikungunya, Filariasis; Control of mosquitoes

Unit V: Siphonaptera as Disease Vectors
Fleas as vectors; Host-specificity, Study of Flea-borne diseases–Plague, Typhus fever; Control of fleas

Unit VI:Sipunculata as Disease Vectors
Human louse (Head, Body and Pubic louse) as vectors;–Typhus fever, Control of human louse

Unit VII: Hempitera as Disease Vectors
Bugs as; Blood-sucking; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

Suggested Readings:

1. Chandra,G. (2000). Mosquito. Sribhumi Publication Co. Kolkata
2. Chapman, R.F. (1998).The Insects: Structure and Function. IV Edition, Cambridge University Press, UK
3. Hati A.K. (1998). Medical Entomology, Allied Book Agency, Kolkata
4. Imms, A.D. (1977). A General Text Book of Entomology. Chapman& Hall, UK
5. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwell
6. Pedigo, L.P. (2002).Entomology and Pest Management. Prentice Hall Publication

4.4 DSEP 2a-Insect Vectors and Diseases Lab 2 Credits

Course outcomes:
This course will enable students to identify life cycle of Mosquito, different kinds of antennae, legs and mouth parts of insects, mounting of wings, larval spiracles and genitalia of any insects, methodology of collection and preservation of insects and to prepare a Project report.

Practical

1. Mounting of mouthparts of Mosquito and Cockroach

2. Identification of following insect vectors through permanent slides/ photographs:,*Xenopsylla,Cimex,Phlebotomus, Musca*

3. Submission of a project report on any one of the insect vectors and disease transmitted

4. Submission of laboratory notebook

Distribution of marks **FullMarks:15**

1. Mounting (any one from Itemno.1)	= 04
2. Identification of vector and disease transmission (any 3fromItem No. 2)	(3× 2)=06
3. Submission of Project Report	= 3
4. Submission of Laboratory Note Book	= 2

Note

Q 1.2mark for mounting and 2 mark for drawing and labelling
Q 2.½mark for identification and 1½mark about disease transmitted

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology

2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology, New Central Book Agency, Kolkata

3. Sinha, J.K. , Chatterjee, A.K.and P. Chattopadhyay Advanced Practical Zoology

Semester -VI

4.5 DSE T2b-Aquatic Biology 4 Credits

Course outcomes:
The theory course would fortify the students with in-depth subject knowledge about aquatic organisms as well as marine biology and management of aquatic resources.

Theory

UNIT1: Aquatic Biomes
Brief introduction of the aquatic biomes: Fresh water ecosystem (lakes, wetlands , streams and rivers),marine ecosystem; estuaries; intertidal zones, oceanic pelagic zone, marine benthic zone

UNIT2: Fresh water Biology
Lakes: Origin and classification, Lake as an Ecosystem, Lake morphometry, Physico–chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide). Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous.
Streams: Different stages of stream development, Physico-chemical environment, Adaptation of hill-stream fishes.

UNIT3: Marine Biology
Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

UNIT4: Management of Aquatic Resources
Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication,Management and conservation(legislations), Sewage treatment; Water quality assessment-BOD and COD

Suggested Readings:

1.Anathakrishnan :Bio resources Ecology 3rd Edition
2.Goldman : Limnology, 2nd Edition
3.Odum and Barrett: Fundamentals of Ecology, 5th Edition
4.Pawlowski :Physicochemical Methods forWaterand WastewaterTreatment,1st Edition
5.Trivedi and Goyal : Chemical and biological methods for water pollution studies
6.Welch : Limnology Vols. I-II
7.Wetzel : Limnology, 3rd edition
8.ডঃ তাপস দেব ও ডঃ সুমিত গিরি (২০২২), স্নাতক প্রাণীবিদ্যা (Semester –V & VI).Santra Publication,Kolkata

4.6 DSE P2b-AquaticBiology Lab 2 Credits

Course outcomes:
This practical course will enable them to identify the important zooplanktons present in a lake ecosystem and to determine the amount of Turbidity/transparency, dissolved Oxygen, and Free Carbon dioxide, alkalinity in water collected from a water body.

Practicals

1. Identify the important zooplanktons present in a pond ecosystem.
2. Determine the pH, dissolved Oxygen, and free Carbon dioxide ,alkalinity (carbonates& bicarbonates)in water collected from a nearby lake / water body.
3. Instruments used in limnology (Secchi disc, VanDorn Bottle, Conductivity meter, Turbidity meter,) and their significance.
4. A Report on a visit to a Sewage treatment plant/Marine bio-reserve/Fisheries Institute/Pond Ecosystem
5. Submission of Laboratory Note Book

Distribution of marks **Fullmarks:15**

1. Identification with reasons (any three) [From Item1 and 3] [2×3]=6
2. One experiment (pH/ free CO_2)(Item 2) [2+3]=5
3. Field visit Report (From Item 4): = 2
4. Submission of laboratory notebook: =2

Note

Q 1. ½mark for identification and1½ marks for characters

Q 2. For Principle 2 marks and for result 3 marks

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology
2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology,New Central Book Agency,Kolkata
3. Sinha, J.K , Chatterjee, A.K. and P. Chattopadhyay Advanced Practical Zoology

DSE 4.7 Immunology 4 Credits

Course outcomes:
The course on immunology deals with the basic principles innate and adaptive Immunity. It also extends clear knowledge of antigenicity and immunogenicity, cells and tissues involved for immunological response, structure and types of Immunoglobulins, Major Histocompatibility Complex, Cytokines and Complement System as well as assay systems for immunoassays.

Theory

Unit1: **Overview of the Immune System**
Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system

Unit2: **Cells and Organs of the Immune System**
Haematopoiesis, Cells and organs of immune system (primary and secondary lymphoid organs)of the immune system

Unit3:Antigens
Basic properties of antigens, B and Tcell epitopes, haptens and adjuvants

Unit4: **Antibodies**
Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis

Unit5: **Working of the immune system**
Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways.

Unit6: **Immune system in health and disease**
Brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immune deficiency

Unit7: Vaccines
General introduction to vaccines, Various types of vaccines, Principle of action of Covaxin against Corona Virus

Suggested Reading

1. Abbas, K. Abul and LechtmanH.Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.
2. Abbas, K.Abul and LechtmanH.Andrew (2011.)Basic Immunology: Functions and Disorders of Immune System. Saunders Elsevier Publication.Delves,
3. Martin,Burtonand Roitt (2006).Roitt's Essential Immunology. 11thEdn.Blackwell Pub.
4. Khan FH (2011) The Elements of Immunology Pearson
5. Kindt, T. J., Goldsby, R.A., Osborne,B.A. and Kuby, J (2006). Immunology,VI Edition.W.H. Freeman and Company.
6. Mohanty, SK and Leela, KS(2014).Text book of Immunology. 2nd Edn. JaypeePub. N. Delhi
7. Parija, SC (2012). Text book of Microbiology and Immunology. 2ndEdn. Elsevier.
8. Playfair, JHL andChain,BM (2001) Immunology at a glance. 7 th Edn. Blackwell Pub.
9. Shetty, N. (2005). Immunology: Introductory Textbook. 2nd Edn. , New Age Internatl. Pub.N. Delhi
10.Virella, G (2007). Medical Immunology 6th Edn. InformaHealthcare
11. .ডঃ তাপস দেব ও ডঃ সুমিত গিরি (২০২২), স্নাতক প্রাণীবিদ্যা (Semester –V & VI).Santra Publication,Kolkata

DSE 4.8 Immunology Lab 2 Credits

Course outcomes:
This course teaches to identify lymphoid organs of human, to identify histological sections of spleen, thymus and lymph nodes, Preparation of stained blood film to study various types of white blood cells and evaluation of clotting time and bleeding time of human blood from student to students.

PRACTICAL

1. Identification of lymphoid organs of human (Model/Photograph).
2. Identification of histological section of spleen, thymus and lymph nodes through slides/photographs
3. Preparation of stained blood film to study various types of blood cells.
4. ABO blood group determination.
5. Demonstration of

a) ELISA

b) Immuno-electrophoresis

6.Submission of Laboratory Note Book

Distribution of Marks

	Fullmarks:15
1. Identification with reasons (any two; From Itemno.1 & 2)	4 (2×2)
2. Preparation of stained blood film [fromitem3]	6 (4+1+1)
3. Blood group determination (From Item no. 4):	3 (2+1)
4. Laboratory note book:	2

Note:

Q1. Identification:½ mark and reasons: 1½ marks

Q2. 4 marks for preparation and1 mark each for identification and drawing

Q3. Experiment:2 marks and result: 1 mark

Suggested Readings:

1. Chatterjee and Chatterjee:Practical Zoology
2. Ghosh, K.C. and Manna,B. (2015): Practical Zoology, New Central Book Agency, Kolkata
3. Sinha, J.K. , Chatterjee, A.K. and P.Chattopadhyay Advanced Practical Zoology

5. Skill Enhancement Course

For Semester -III

5.1 SECT1–Apiculture (EconomicZoology) 2 Credits

Course outcomes:
This course provides knowledge on biology of bees, Social Organization of Bee Colony, Rearing of Bees, Methods of Extraction of Honey, diseases and enemies as well as Economic importance of Apiculture industry and its uses.

Unit1:Biology of Bees

1. Classification and Biology of Honey Bees
2. Social Organization of Bee Colony

Unit2:Rearing of Bees

1. Artificial Bee rearing (Apiary), Beehives- Newton and Langstroth
2. Bee Pasturage
3. Selection of Bee Species for Apiculture
4. Bee Keeping Equipment
5. Methods of Extraction of Honey (Indigenous and Modern)

Unit3 Diseases and Enemies

1. Bee Diseases and Enemies
2. Control and Preventive measures

Unit4: Bee Economy

Products of Apiculture Industry and its uses (Honey, BeesWax, Propolis)

Unit5:Entrepreneurship in Apiculture

Bee Keeping Industry –Recent Efforts, Modern Methods in employing artificial Bee hives for cross pollination in horticultural gardens

For Semester -IV

5.2 SECT2 Aquarium Fish Keeping(Economic Zoology) 2 credits

Course outcomes:
The course extends to gain knowledge on Exotic and Endemic species of Aquarium Fishes, Biology of Aquarium Fishes, Food and feeding of Aquarium fishes, Fish Transportation and maintenance of Aquarium.

Unit1:Introduction to Aquarium Fish Keeping

Exotic and Endemic species of Aquarium Fishes

Unit2:Biology of Aquarium Fishes

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Goldfish, Angel fish, Blue morph, Anemone fish and Butterfly fish

Unit3: Food and feeding of Aquarium fishes

Use of live fish feed organisms. Preparation and composition of formulated fish feeds, Aquarium fish as larval predator

Unit4:Fish Transportation

Live fish transport- Fish handling, packing and forwarding techniques.

Unit5:Maintenance of Aquarium

General Aquarium maintenance-budget for setting up an Aquarium Fish Farm as a Cottage Industry

For Semester -V

5.3 SECT3 –Sericulture (Economic Zoology) 2 Credits

Course outcomes:
The course will enable students to study the fundamentals of sericulture including rearing of silk worms, biology of silk worms, processing and management of silk industry e.t.c.

Unit1: Introduction
1.Types of silkworms, Distribution and Races

2.Exotic and indigenous races

3.Mulberry and non-mulberry Sericulture

Unit2:Biology of Silk worm
1.Life cycle of *Bombyx mori*

2.Structure of silk gland and secretion of silk

Unit3:Rearing of Silk worms
1.Selection of mulberry variety and establishment of mulberry garden

2.Rearinghouse and rearing appliances..

3. Disinfectants: Formalin, bleaching powder, RKO

4.Silkworm rearing technology: Early age and Late age rearing

5.Types of mountages

6.Spinning, harvesting and storage of cocoons

Unit4:Pests and Diseases
1.P ests of silkworm

2. Diseases: Protozoan, viral, fungal and bacterial

3. Control and prevention of pests and diseases

Unit5:Entrepreneurship in Sericulture
Prospects of Sericulture in India: Sericulture industry indifferent states, employment, potential in mulberry and non-mulberry sericulture; Visit to sericulture centres.

For Semester -VI

5.4SECT4 Medical Techniques 2 Credits

Course outcomes:
The course will help students to learn basic concept of Medical Techniques like Diagnostics Methods Used for Analysis of Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.), Clinical Biochemistry LFT, Lipid profiling e.t.c.

Unit1:
Introduction to Medical Diagnostics and its Importance

Unit2:
Diagnostics Methods Used for Analysis of Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

Unit3:
Diagnostic Methods used for Urine Analysis: Physical characteristics: Abnormal constituents

Unit4:
Non-infectious Diseases, Diagnosis and prevention of Diabete s (Type Iand Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Unit5:
Infectious Diseases Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis, Malarial parasite (Microscope based and ELISA based)

Unit6:
Clinical Biochemistry LFT, Lipid profiling

Unit7:
Tumours Types (Benign/Malignant), Detection and metastasis: Medical imaging: X-Ray ofBonefracture, PET, MRI and CT scan (using photographs).