



Shri Sangameshwar Education Society's
Sangameshwar College, Solapur [Autonomous]
 Kannada Linguistic Minority Institute
 NAAC Accredited with 'A' Grade (III Cycle CGPA 3.39)

Academic Council 3(3.3)
 10th August, 2021

UG Science Programme: B.Sc.-II: To be implemented from A.Y. 2021-2022

System: Choice Based Credit System (CBCS) with SGPA and CGPA

Programme: **ZOOLOGY**

Syllabus for: Discipline Specific Core Courses (DSC-C and DSC-D)

Structure and Examination for: Discipline Specific Core Courses (DSC-1C and DSC-1D)

Table-3

Semester	Course		Teaching Scheme/week			
			Course Code	Hours	Lectures	Credits
III	DSC-1C	Theory Paper-V: CELL BIOLOGY	2131313	4.8	6	4
		Theory Paper-VI: PRINCIPLES OF ECOLOGY	2131314			
		Practical-II: CELL BIOLOGY AND PRINCIPLES OF ECOLOGY	2131425	6.4	8	4
	SEC-1	Theory Paper-I: Gr. B: Soil Health Management	2131320	4.8	6	2
IV	AECC-C	ENVIRONMENTAL STUDIES	2131315	3.2	4	4
	DSC-1D	Theory Paper-VII: FUNDAMENTALS OF BIOCHEMISTRY	2131413	4.8	6	4
		Theory Paper-VIII: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS				
		Practical-III: FUNDAMENTALS OF BIOCHEMISTRY AND ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS	2131425	6.4	8	4
	SEC-2	Theory Paper-II: Gr. B: Soil Health Management	2131429	4.8	6	2

Table-4

Semester	Course		EXAMINATION			Credits
			Marks			
			CA	SEE	Total	
III	DSC-1C	Theory Paper-V: CELL BIOLOGY	15	35	50	2
		Theory Paper-VI: PRINCIPLES OF ECOLOGY	15	35	50	2
	SEC-1	Theory Paper-I: Gr. B: Soil Health Management	15	35	50	2
IV	AECC-C	ENVIRONMENTAL STUDIES	15	35	50	4
	DSC-1D	Theory Paper-VII: FUNDAMENTALS OF BIOCHEMISTRY	15	35	50	2
		Theory Paper-VIII: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS	15	35	50	2
	SEC-2	Theory Paper-II: Soil Health Management	15	35	50	2
	DSC-1C & DSC-1D	Practical-II and III: CELL BIOLOGY AND PRINCIPLES OF ECOLOGY, FUNDAMENTALS OF BIOCHEMISTRY: CONTROLLING AND COORDINATING SYSTEMS, FUNDAMENTALS OF ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS	60	140	200	8

CA: Continuous Assessment SEE: Semester End Examination

Note:-

The above structure (Table-3 and Table-4) is for Sem-III and Sem-IV of the undergraduate B.Sc.-II programmes* under science faculty.

*B.Sc.-II Select any three DSC from the four core courses opted at B.Sc.- I.

DSC: Discipline Specific Core Course **AECC:** Ability Enhancement Compulsory Course

SEC: Skill Enhancement Course

Passing in each course is compulsory including Environment Studies course.

SGPA/CGPA and Total Marks will be calculated excluding AECC course.

Passing in each course is compulsory. SGPA/CGPA and Total Marks will be calculated excluding AECC course.

SEM III

Academic Council 3(3.3)
10th August, 2021

DSC-C Theory-I Title: CELL BIOLOGY

ZOOLOGY-V (2131313) (50 Marks and 2 credits)

CA: Continuous Assessment -15 SEE: Semester End Examination -35 Total marks: 15+35=50

DSC-C Theory-I: Paper -V: Title: CELL BIOLOGY		Hours 36
Unit1	Prokaryotic and Eukaryotic cells – Difference in Plant cell and Animal cell	2
Unit2	Plasma Membrane Structure and functions of plasma membrane , Singer & Nicolson's model of plasma membrane.	3
Unit3	Endomembrane System- Structure and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes	7
Unit4	Mitochondria Mitochondria: Ultrastructure, functions of Mitochondria. Electron Transport system and mechanism of ATP synthesis	5
Unit5	Cytoskeleton : Structure and Functions: Microtubules, Microfilaments and intermediate filaments	4
Unit6	Nucleus : Structure and functions of Nucleus, Nuclear envelope, Nuclear pore complex, Nucleolus, Nuclear lamina	4
Unit7	Chromatin: structure of nucleosome, Euchromatin, Hetrochromatin and barr bodies	2
Unit8	Cell Division Cell cycle, Mitosis and Meiosis and their significance	6
Unit9	Cell Signalling : Types of cell signalling , Brief idea of G-Protein Coupled Receptor (GPCR) and Role of secondary messengers (cAMP)	3
PROGRAM OUTCOMES OF B.Sc. PROGRAM PO1 Acquire skill, training and knowledge to enhance thinking, comprehension and application abilities to compete, succeed and excel globally. PO2 Gain knowledge and experience (through theory, experiments, tutorials, projects and industrial / field visits), to achieve ultimate progress and improvement, to be capable of employment and meet the global competencies. PO3 Identify, formulate and analyse problems. Create, select, and apply suitable techniques, resources, and modern scientific tools to accomplish verified conclusions with an understanding of the limitations. PO4 Apply moral principles and commit to the norms of scientific practice in every endeavour. Validate expertise to conduct wide range of scientific experiments to solve problems. PO5 Communicate efficiently scientific events with the Scientific community and with Society at large with capability to comprehend and pen operative		

reports and design documentation, make effective presentations, and give and receive clear instructions.	
PO6 Reveal knowledge with thoughtful expression of the scientific principles in one's own work, as an individual member and capable leader in a team, to manage projects in multidisciplinary environments.	Blooms taxonomy level
Learning Outcome : Student will be able to	
CO1: Classify the cells based on components and morphology of cell	Apply
CO2: Understand the structure and function of plasma membrane	Understand
CO3: Differentiate the functioning of cell organelles	Analyze
CO 4: Understand the structure and function of mitochondria	Understand
CO 5: Differentiate the structure and function of Microtubules, Microfilaments and intermediate filaments.	Analyze
CO 6: : Understand the structure and function of mitochondria	Understand
CO 7: Differentiate the Euchromatin and Hetrochromatin (Bar bodies) or male and female cells	Analyze
CO 8: Differentiate the type of cell division in various cells.	Analyze
CO 9: Understand the mechanism of cell communication	Understand

B.Sc. II Zoology (CBCS Pattern)
Discipline Specific Core Courses (DSC-C)

Sem III

Academic Council 3(3.3)
10th August, 2021

DSC-C Theory-II Title: PRINCIPLES OF ECOLOGY

ZOOLOGY-VI (2131314) (50 Marks and 2 credits)

CA: Continuous Assessment -15 SEE: Semester End Examination -35 Total marks: 15+35= 50

DSC-C Theory-II Paper VI Title: PRINCIPLES OF ECOLOGY		Hours 36
Unit 1	Introduction to Ecology : Introduction and scope of ecology, Autecology and synecology	2
Unit 2	Population Ecology : Brief idea about attributes of population: Density , natality, mortality, fecundity, survivorship curves.	3
Unit 3	Animal Associations- Brief idea and definitions a) Intraspecific associations : Parental care and general characteristics of social behaviour in animals b) Interspecific associations : commensalism, mutualism, predation and parasitism	7
Unit 4	Abiotic Factors: Introductions & influence on animals : Temperature, light, water, water hardness, humidity, soil, oxygen and Green Houses Gases (GHG) .	5
Unit 5	Community characteristics : species richness, dominance, diversity, abundance.	4
Unit 6	Ecosystem General characteristics : a) Aquatic (freshwater ecosystem: lotic and lentic) b) Terrestrial (forest , grassland and desert ecosystem).	5
Unit 7	Food chain, Food web , Energy flow , Ecological pyramids and their types .	4
Unit 8	Mineralization and recycling of nutrients : Hydrological cycle, Carbon, Nitrogen, Phosphate & Sulpher .	3
Unit 9	Applied Ecology : Brief idea of: Biodiversity hot-spots in India and IUCN Red List Categories	3
Learning Outcome : Student will be able to		Blooms taxonomy level
CO 1: Understand the scope of ecology		Understand
CO 2: Apply the population attributes to understand the population dynamics.		Apply
CO 3: Utilize the information of various modes of animal associations for conservation of nature, rearing of animals, biological pest control		Analyze
CO 4: Relate the interactions of various abiotic components of an ecosystem.		Analyze
CO 5: Calculate diversity indices		Apply
CO 6: Compare various ecosystems.		Evaluate
CO 7: Analyse the balancing factors of the nature		Analyze

CO 8: Understand the threats to environment.	Understand
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B.Sc. II Zoology (CBCS Pattern)

Discipline Specific Core Courses (DSC-D)

Sem IV

Academic Council 3(3.3)

10th August, 2021

DSC-D Theory-I Title: FUNDAMENTALS OF BIOCHEMISTRY

ZOOLOGY-VII (2131413) (50 Marks and 2 credits)

CA: Continuous Assessment -15 SEE: Semester End Examination -35 Total marks: 15+35= 50

DSC-D Theory-I Paper VII Title: FUNDAMENTALS OF BIOCHEMISTRY		Hours 36
Unit 1	Carbohydrates: Structure and biological Significance of: Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates, Causes of Type II diabetes	4
Unit 2:	Lipids: Structure, biological Significance and Physiologically important of saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Cholesterol and Steroids. Causes of Atherosclerosis	4
Unit 3	Amino Acids: Amino acids: Structure, Classification and General Properties of amino acids. Essential and non -essential aminocids.	3
Unit 4:	Proteins: Levels of organization in proteins (primary, secondary, tertiary & quaternary); Simple and conjugate proteins with examples. Functions of proteins.	4
Unit 5:	Immunoglobulins: Basic Structure, Types and biological significance of antibodies.	2
Unit 6	Nucleic Acids : Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids	2
Unit 7:	DNA Structure and types of DNA, Base pairing in DNA, Denaturation and Renaturation of DNA, Properties of DNA and significance of DNA.	4
Unit 8:	RNA Structure, types and functions : Structure of mRNA, rRNA, tRNA.	3
Unit 9:	Central Dogma Basic concepts and meanings of terminologies of : replication, transcription and translation in prokaryotes	3
Unit 10:	Enzymes: Nomenclature and classification; Co-factors; Properties of enzymes; Mechanism of enzyme action; Factors affecting enzyme actions; Isoenzyme	7
Learning Outcome : Student will be able to		Blooms taxonomy level
CO 1: Classify the carbohydrates		Apply
CO 2: Classify the lipids		Apply

CO 3: Classify the aminoacids	Apply
CO 4: Understand the protein folding mechanism.	Understand
CO 5: Understand the structure, types and functions of antibodies	Understand
CO 6: Understand the structure of nucleic acids	Understand
CO 7: Understand the basic cell maintenance mechanism.	understand
CO 8: Classify different enzymes	Apply

B.Sc. II Zoology (CBCS Pattern)
Discipline Specific Core Courses (DSC-D)

Sem IV

Academic Council 3(3.3)
 10th August, 2021

**DSC-D Theory-II Title: ANIMAL PHYSIOLOGY: CONTROLLING AND
 COORDINATING SYSTEMS**

ZOOLOGY-VIII (2131414) (50 Marks and 2 credits)

CA: Continuous Assessment -15 SEE: Semester End Examination-35 Total marks: 15+35= 50

DSC-D Theory-II Paper VIII Title: ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS		Hours 36
Unit1	Tissues: Structure, location, classification and functions of: epithelial tissue, connective tissue, muscular tissue and nervous tissue. Study of Blood tissue –Types of blood cells (RBC,WBC ,Platelets , Plasma), functions of blood cells	6
Unit2	Histology of following mammalian organs: i) Tooth ii) Salivary gland iii) Stomach iv) Ilium v) Pancreas vi) Liver vii) Testis viii) Ovary	4
Unit3	Nervous System : Ultrastructure of neuron, resting membrane potential, origin of action potential and its propagation across the nerve fibres; Structure of Synapse and Synaptic transmission	5
Unit4	Muscle : Types of muscles cells (smooth, Striated, cardiac) and Ultra structure of skeletal muscle; Molecular mechanism of muscle contraction.	4
Unit5	Reproductive Physiology : Pituitary gland- FSH and LH hormones, male & female sex hormones.	3
Unit6	Reproductive Cycle: Oestrous cycle and Menstrual cycle Hormonal changes during pregnancy, parturition and lactation. Contraception methods: Physical, oral contraceptives pills, IUD, surgical methods.	6
Unit7	In-vitro Fertilization: Technique of IVF and its applications	2
Unit8	Endocrine System : Structure and function of endocrine glands: Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal.	6
Learning Outcome : Student will be able to		Blooms taxonomy level
CO 1: Classify cells and tissue		Analyze
CO 2: Differentiate tissue		Analyze
CO 3: Understand the functioning of nerve cells.		Understand

CO 4: Understand the functioning of muscle cells.	Understand
CO 5: Interpolate the coordination of hormones involved in reproductive physiology.	Apply
CO 6: Interpolate the coordination of hormones involved in reproductive cycle.	Apply
CO 7: Understand the importance of IVF	Understand
CO 8: Interpolate the coordination of hormones of endocrine glands.	Apply

B.Sc. II Zoology (CBCS Pattern)
Discipline Specific Core Courses (DSC-C)
Practical Sem III and IV

Academic Council 3(3.3)
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ZOOLOGY PRACTICAL-II AND III (2131425)

DSC-C Practical-II CELL BIOLOGY AND PRINCIPLES OF ECOLOGY

CA: Continuous Assessment -30 SEE: Semester End Examination -70 Total marks: 30+70= 100
(36 Hrs and 2 credits)

DSC- C Practical-II CELL BIOLOGY AND PRINCIPLES OF ECOLOGY	
Sr.No	TITLE
1	Preparation of temporary stained squash of onion root tip to study various stages of mitosis.
2	Study of various stages of meiosis in onion flower buds.
3	Temporary stained preparation of nucleus from given sample.
4	Temporary stained preparation of mitochondria from given sample by using Janus Green B stain.
5	Demonstration/ Observation of Barr body using permanent slide(s) (spotter).
6	Isolation of nucleus by using centrifugation technique.
7	Study and construction of ecological pyramid from given data: Members of Pond ecosystem – Sponge, Nepa, Leech, Planaria, Hydra, Lymnea, Planorbis, Heron, Kingfisher, Cyclops, Daphnia, Tortoise, Diatoms Vallisneria, Hydrilla, Chara and Spirogyra.
8	Study and construction of ecological pyramid from given data: Members of Grass land ecosystem – Grasshopper, Rat Snake, Grass, Herbs, Shrubs, Weeds, Vulture, Squirrel, Earthworm, Centipede, Scorpion, Rabbit and Indian Bustard, peacock.
9	Study and construction of ecological pyramid from given data: Members of forest ecosystem –Cricket, stick insect, viper, Rat Snake, Grass, Herbs, Shrubs, Weeds, Trees, Owl, Squirrel, Earthworm, Centipede, Scorpion, Monkeys, Rabbit and Indian Bustard, Lion, Tiger, Hyna.
10	Calculation of Shannon-Weiner diversity index from the given data/ model.- 5 examples.
11	Water sampling method- Collection of Zooplanktons by using plankton net.
12	Counting of Zooplanktons by using Sedgewick-Rafter Counting Chamber.
13	Identification of Zooplankton from collected water sample.
14	Estimation of Dissolved Oxygen (Winkler's method) from given sample.
15	Estimation of pH of water from given sample.

16	Estimation of Total Hardness content from given sample.
17	Study Visit: Preparation of models, Report on a visit to National / Central / State institutes / Local water bodies / National Park / Biodiversity Park/Wild life sanctuary, Ecotourism, Trekking

Practical Sem III and IV

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DSC-D Practical-III FUNDAMENTALS OF BIOCHEMISTRY AND ANIMAL PHYSIOLOGY: CONTROLLING AND COORDINATING SYSTEMS

CA: Continuous Assessment -30 SEE: Semester End Examination -70 Total marks: 30+70= 100

(36 Hrs and 2 credits)

Sr. No	TITLE
1	Biochemical tests of samples containing carbohydrates, proteins and lipids.
2	Estimation of protein by Biuret Method.
3	Estimation of carbohydrates by DNS Method.
4	Isolation and estimation of aminoacids by using chromatography paper.
5	Action of amylase enzyme in digestion of starch.
6	Effect of pH on amylase enzyme activity.
7	Effect of temperature on amylase enzyme activity.
8	Study of permanent slides (T.S./V, S.) - of Mammalian organs using permanent slides (Spotters): i) Tooth ii) Salivary gland iii) Stomach iv) Liver v) Kidney vi) Pancreas vii) Testis viii) Ovary
9	Study of ABO blood group system from given blood sample.
10	Preparation and staining of given blood smear and identification of WBC cells.
11	Total count of RBC from a given blood sample by using Neubauer chamber.
12	Total count of WBC from a given blood sample by using Neubauer chamber.
13	Microtomy: Study of principle, procedure and mechanism of micro-technique for the preparation of permanent slides: a) Fixation of tissue b) Embedding wax and Preparation of blocks c) Gradient hydration and dehydration and staining with HE

14	Study visit: Preparation of models, Visit to wetlands, R&D labs, medical college, pathology laboratory and blood bank OR Preparation and submission of small project/ review on topics related to ecology, cell biology, biochemistry and physiology
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Teaching-Learning Equipment's/Tools/Methods/etc.:

- 1) ICT
- 2) Books
- 3) Charts
- 4) Models
- 5) Specimens
- 6) Lab equipment's

List of Books:

Sr. No.	Title	Authors	Publisher
1	Cell and Molecular Biology: Concepts and Experiments.	Karp, G. (2010).	VI Edition. John Wiley and Sons. Inc.
2	Cell and Molecular Biology.	De Robertis, E.D.P. and De Robertis, E.M.F. (2006).	VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
3	The Cell: A Molecular Approach.	Cooper, G.M. and Hausman, R.E. (2009).	V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA
4	The World of the Cell.	Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009).	VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
5	Molecular Biology of the Cell	Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008).	V Edition, Garland publishing Inc., New York and London.
6	Ecology. II Edition.	Colinvaux, P. A. (1993).	Wiley, John and Sons, Inc.

7	Ecology.	Krebs, C. J. (2001).	VI Edition. Benjamin Cummings.
8	Fundamentals of Ecology.	Odum, E.P., (2008).	Indian Edition. Brooks/Cole
9	Ecology and field biology	Robert Leo Smith	Harper and Row publisher
10	Ecology. V	Ricklefs, R.E., (2000).	Edition. Chiron Pres
11	Principles of Biochemistry,	Lehninger, Cox, M.M and Nelson, D.L. (2008).	V Edition, W.H. Freeman and Co., New York.
12	Biochemistry,	Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007).	VI Edition, W.H. Freeman and Co., New York.
13	Harper's Illustrated Biochemistry,	Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009).	XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.
14	Instant Notes in Biochemistry,	Hames, B.D. and Hooper, N.M. (2000).	II Edition, BIOS Scientific Publishers Ltd., U.K.
15	Molecular Biology of the Gene,	Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. (2008).	VI Edition, Cold Spring Harbor Lab. Press, Pearson Pub.
16	Textbook of Medical Physiology.	Guyton, A.C. & Hall, J.E. (2006).	XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.
17	Principles of Anatomy & Physiology.	Tortora, G.J. & Grabowski, S. (2006).	XI Edition John Wiley & sons
18	De Fiore's Atlas of Histology with Functional correlations.	Victor P. Eroschenko. (2008).	XII Edition. Lippincott W. & Wilkins

Dr. M.B. Bagale
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