FACULTY OF LIFE SCIENCES

SYLLABUS

For

Bachelor of Science (Biotechnology) Semester I and II (Under Credit Based Continuous Evaluation Grading System) (12+3 System of Education)

Session: 2023-24



The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Bachelor of Science (Biotechnology) Semester I										
Course	Course	Course	Cre	dits	Total	Marks				Examination
Code	Title	type	L	Р	credits	L	Р	CA	Total	time (Hours)
BBTL- 1483	Cell Biology	С	3	0	3	40	-	10	50	3
BBTP- 1488	Lab in Cell Biology	С	0	1.5	1.5	-	20	5	25	3

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Bachelor of Science (Biotechnology) Semester II										
Course	Course	Course	Credits		Total	Marks				Examination
Code	Title	type	L	P	credits	L	Р	CA	Total	time (Hours)
BBTL-	Zoology-	C	3	0	3	40	-	10	50	3
2484	Ι									
BBTP- 2488	Lab in	С	0	1.5	1.5	-	20	5	25	3
	Zoology-									
	Ι									

Bachelor of Science (Bio-Technology) Semester-I

Session: 2023-24 Course Code: BBTL-1483 Course Title: Cell Biology (Theory)

COURSE OUTCOMES:

- **CO1**. Understanding the basic unit of life cell and broad classification of cell types.
- **CO2**. Understanding the structure and functions of cell organelles.
- **CO3**: Understand Cell Division and Cell Cycle.
- > CO4. Understanding the biological membranes along with membrane transport mechanism.

Bachelor of Science (Bio-Technology) Semester-I Session: 2023-24 Course Code: BBTL-1483 Course Title: Cell Biology (Theory)

Time: 3 Hrs.

Max. Marks: 50 Theory: 40 CA: 10

Instructions for the Paper Setter

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

Unit-I

Cell as a basic unit of living systems. The cell theory Broad Classification of Cell Types: PPLO's, bacteria, eukaryotic microbes, plant and animal cells. A detailed classification of cell types within an organism. Cell, tissue, organ and organism as different levels of organizations of otherwise genetically similar cells.

Unit-II

Structure and function of cell organelles, ultrastructure of cell membrane, cytosol, Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeletal structures (actin, microtubules etc.), Mitochondria, chloroplasts, lysosomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin).

Unit-III

Cell Division and Cell Cycle: mitosis, meiosis, stages of cell cycle, binary fission, amitosis and its regulation. Cell-cell interaction, Cell locomotion (amoeboid, flagellar and ciliar).

Unit-IV

Biological Membranes: Supramolecular architecture of membranes; Solute transport across membranes; Model membranes and Liposomes.

Books Recommended:

- 1. De-Robertis, F.D.P. and De-Robertis Jr. E.M.F. (2017) Cell and Molecular Biology, Saunders, Philadelphia.
- Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh and Matsudaira (2007) Molecular Cell Biology 6th Edition, W.H.Freemen& Co Ltd.
- Geoffrey, M. Cooper & Robert E. Hausman (2013) The Cell: A molecular approach 6th Edition, Sinauer Associates.
- 4. Alberts, Johnson, Lewis, Raff, Roberts and Walter (2008) Molecular Biology of the Cell, 5th Edition, Garland Science.

Bachelor of Science (Bio-Technology) Semester-I Session: 2023-24 Course Code: BBTP-1488 Course Title: Lab in Cell Biology (Practical)

COURSE OUTCOMES:

- > CO1. Perform a variety of molecular and cellular biology techniques.
- **CO2**. Describe cellular membrane structure and function, fine structure and function of cell organelles.
- **CO3**. Understand Microtomy, staining and histology of different tissues.
- **CO4**. Study about electron micrographs of different organelles

Bachelor of Science (Bio-Technology) Semester-I Session: 2023-24 Course Code: BBTP-1488 Course Title: Lab in Cell Biology (Practical)

Time: 3 Hrs.

Max. Marks: 25 Practical: 20 CA: 5

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

- 1. Study of Cells:
- (a) Prokaryotic cells: Lactobacillus, E. coli. Blue green algae.
- (b) Eukaryotic cells: Testicular material (for studies of spermatogenesis)
- Study of electron micrographs of various cell organelles-plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic Reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen, lipids, etc.
- 3. Preparation of Permanent Slides: Principles and procedures- Section cutting of tissues and staining of tissues with Haematoxylin/eosin method.
- 4. Study of permanent slides of various tissues (gut region, liver, lung, spleen, kidney, pancreas, testis, ovary, tongue, skin etc.).
- 5. Preparation of Buccal Smear for microscopic examination.
- 6. Barr body observation in human squamous epithelial cells.
- 7. Microtomy of Plant Tissue specimens (Stem & Root)

Books Recommended:

- Shah, V.C., Bhatavdekar, J., Chinoy, N.J. and Murthy, S.K. (1988). Essential techniques in Cell Biology. Anand Book Depot, Ahemadabad.
- 2. Celis, J.E. (1998) Cell Biology: A Laboratory handbook. Vol. 1-3. Academic Press, UK.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2023-24 Course Code: BBTL-2484 Course Title: Zoology-I (Theory)

COURSE OUTCOMES

- > CO1 Understand the general classification of Kingdom Animalia.
- > CO2 Understand the digestive system, respiratory system of man.
- > CO3 Understand the excretory and circulatory system of man.
- > CO4 Understand the skeletal system, neural integration and endocrine system of man.

Bachelor of Science (Bio-Technology) Semester-II Session: 2023-24 Course Code: BBTL-2484 Course Title: Zoology-I (Theory)

Time: 3 Hrs.

Max. Marks: 50 Theory: 40

CA: 10

Instructions for the Paper Setters: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Unit-1

Introduction to Animal Kingdom and its diversification:

Overview and General classification of Kingdom Animalia, General Characteristics of each group upto class level with an example.

Unit-2

Digestive System: The alimentary canal and associated glands of Man. Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intracellular digestion, enzymatic digestion and symbiotic digestion.

Respiratory System: Respiratory system of man, Transport of O2 and CO2, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

Unit-3

Circulatory System: General plan of circulation in Man, structure of human heart. Origin and regulation of heart beat, Electrocardiogram, Cardiac output and Blood pressure, Composition and functions of blood and lymph, Blood clotting, blood groups including Rh-factor.

Excretory system: Structure of Kidney and nephron. Urine formation and osmoregulation.

Unit-4

Skeletal system: Ultrastructure, chemical and physical basis of skeletal muscle contraction.

Neural Integration: Structure and functions of brain, Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural junction.

Endocrine System: Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads of man.

Suggested Readings:

- 1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, VishalPublishers, Jalandhar.
- 2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of LifeSciences. Vishal Publishers, Jalandhar.
- 3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Bachelor of Science (Bio-Technology) Semester-II Session: 2023-24 Course Code: BBTP-2488 Course Title: Lab in Zoology-I (Practical)

COURSE OUTCOMES

- > CO1 Understand the estimation of blood haemoglobin
- CO2 Familiarize with the various systems of mammals such as digestive, arterial, venous and urinogenital systems.
- > CO3 The students will be able to record blood pressure and blood groups.
- > CO4 Analyse the food stuff for the presence of starch, protein and fats.

Bachelor of Science (Bio-Technology) Semester-II Session: 2023-24 Course Code: BBTP-2488 Course Title: Lab in Zoology-I (Practical)

Time: 3 Hrs.

Max. Marks: 25 Practical: 20 CA: 5

Note: The question paper will be set by the examiner based on the syllabus.

1. Study the following system of mammals with the help of charts / models /videos:

Digestive, Arterial, Venous and Urinogenital systems.

- 2. Analysis of food stuff for the presence of starch, protein and fats.
- 3. Determination of blood groups of human blood samples.
- 4. Recording of blood pressure of man.
- 5. Estimation of hemoglobin content.
- 6. Make a temporary preparation of the following:

Blood smear of mammals.

7. Visit to clinical laboratory / hospital for demonstration of ECG, ECHO, X-ray, ultrasound, CT-scan and MRI.