Sant Baba Bhag Singh

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PO, PEO, PSO and CO

of

(Life Sciences)

Sant Baba Bhag Singh University
Village Khiala
P.O. Padhiana
Distt. Jalandhar

SANT BABA BHAG SINGH UNIVERSITY, KHIALA -1430030, JALANDHAR		
Institute Name:		UIS
Department Name:		Life Sciences and Allied Health Sciences
Programme Name:		B. Sc. Medical Laboratory Sciences
Number of Semesters		6
Vision:		To bridge the gap between demand and supply for Life Science and Allied Health Professionals with grooming young generations along with their moral and spiritual development.
Mission:		To radiate the knowledge of Life Science and Allied Health Science through quality education by using latest technology, modern infrastructure and the framework needed for the development of professionals.
Details of Programme Educational Objectives, Program Outcomes, Program Specific Outcomes		
o.	Programme Educational Objective (PEO) (The Graduate/Undergraduate will be able to ……)	
1	PEO1	To provide a hands-on experience of the latest techniques.
	PEO2	To improve critical and analytical abilities.
	PEO3	To inculcate management and evaluation of laboratory information systems.
	PEO4	To apply the subject related knowledge towards professional growth.
	Programme Outcomes (PO) (At the end of Programme/Degree mentioned above, the graduates will be……)	
2	PO1	Apply the knowledge and skills appropriate to discipline for quality clinical investigations.
	PO2	Develop competency to think creatively, critically and objectively using core and inter-disciplinary excellence.
	PO3	Demonstrate appropriate methods of specimen collection, handling, testing and reporting of clinical investigation.
	PO4	Identify and evaluate clinical data and results by applying knowledge and skills.
	PO5	Operate and maintain laboratory equipments employing appropriate quality control and safety procedures.
	PO6	Have collaborative and multidisciplinary skills to work as an effective member or leader to achieve goals.
	PO7	Acquire and apply latest knowledge by utilizing appropriate learning methods.
	PO8	Recognize ethical and professional responsibilities, considering the impact on society and environment.
	PO9	Communicate effectively and sensibly with a broad range of health care workers, co-workers as well as patients.
	PO10	Become the government medical laboratory professionals, scientists, and mentors of the future.
	Programme Specific Outcomes (PSO)	
3	PSO1	Graduates will be able to demonstrate the ability to critically evaluate and properly and effectively communicate laboratory data and information from the scientific literature.
	PSO2	Graduates will be able to evaluate clinical laboratory data and relate that data to various disease processes.
	PSO3	Graduates will acquire an understanding of a variety of laboratory and computer skills/techniques/calculations that are used in biomedical research and clinical laboratories.
	PSO4	Graduates will be able to understand and identify potential hazards and follow safe laboratory practices.

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Dr. Vikas Sharma (Dean)

		Programme Name:	B.Sc MLS		
S. No	**Semester**	**Course Name**	**Course Code**	**Details of Course Outcomes**	
				Course Outcomes	
1	1	Human anatomy & Physiology – I	MLS 101	**CO1**	At the conclusion of the course, students will be able to explain the anatomy, physiology and functions of various organs mentioned in chapters.
				CO2	Students will understand the homeostatic mechanisms and altered physiology of digestive system.
				CO3	Students will apply concepts and knowledge of terminology related to the cardiovascular, digestive system and structure and function of blood and lymphatic system
2	1	Fundamentals of Biology	MLS 105	**CO1**	At the conclusion of the course, students will describe the structures and biological functions of cells and their components such as DNA, RNA, lipids, carbohydrates and protein.
				CO2	Students will explain the metabolic pathways cells use to obtain and transform energy during the life cycle.
				CO3	Students will explain the molecular basis of inheritance and cell division.
3	1	General Microbiology	MLS 109	**CO1**	At the conclusion of the course, students will understand the theory, principle, working, maintenance and precautions of different equipments and microbial techniques
				CO2	Students will demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures
				CO3	Students will comprehend aseptic techniques and be able to perform routine culture handling tasks safely and effectively
4	1	Hematology – I	MLS 113	**CO1**	At the conclusion of the course students will be : able to apply principles of protection, quality declaration and excellence regulation in Hematology
				CO2	Students will be able to understand the value and clinical significance of routine hematological tests.
				CO3	Students will be able to accomplish and describe ideologies and procedures of hematopoiesis and staining techniques
5	1	Communication Skills – I	ENG121	**CO1**	At the conclusion of the course; students will have fairly good proficieny in reading comprehension
				CO2	Students will have enhanced writing skills and have command in official/corporate communication
				CO3	Students will develop confidence in making presentation; oral or documentary
6	1	Human anatomy & Physiology – I Practical	MLS 103	**CO1**	At the conclusion of the course, students will be able to explain the anatomy, physiology and functions of various organs mentioned in chapters.
				CO2	Students will understand the homeostatic mechanisms and altered physiology of digestive system.
				CO3	Students will apply concepts and knowledge of terminology related to the cardiovascular, digestive system and structure and function of blood and lymphatic system
7	1	Fundamentals of Biology Practical	MLS 107	**CO1**	At the conclusion of the course, student will be: able to understand the basics cycles of cellular division like mitosis and meiosis
				CO2	Students will be able to understand and interpret micrographs of different cell structures and evolution through charts and models.
				CO3	Students will be able to identify and recognise the structure of cellular organelles by Staining techniques.
8	1	General Microbiology Practical	MLS 111	**CO1**	At the conclusion of the course, students will understand the basic safe code of practice for a Microbiology laboratory
				CO2	Students can prepare the cleaning agents & familiarize with the technique for cleaning & sterilization
				CO3	Students will understand the theory, principle, working, maintenance and precautions of different equipments and microbial techniques
9	1	Haematology – I Practical	MLS 115	**CO1**	At the conclusion of the course; students will: become familiar with the performance of routine and specialized laboratory techniques for the evaluation of blood cells
				CO2	Students will be able to perform and elucidate principles and procedures of tests and characterise the errors that may occur during manual testing
		Communication Skills – I		**CO1**	At the conclusion of the course; students will have fairly good proficieny in reading comprehension

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10	1	Communication Skills – I Lab	ENG123	CO2	Students will have enhanced writing skills and have command in official/corporate communication
				CO3	Students will develop confidence in making presentation; oral or documentary
11	2	Biochemistry – I	MLS 102	CO1	At the conclusion of the course, students will be able to understand the structure and functions biomolecules.
				CO2	Students will apply this knowledge to solve the complexity of macromolecules
				CO3	Students will be able to analyze the influence and role of structure in reactivity of biomolecules
12	2	Basics of Medical Laboratory Technology	MLS106	CO1	At the conclusion of the course,Students are exposed to basic laboratory techniques on biological specimens and comply with safety regulations and universal precautions
				CO2	Students will achieve precautionary and corrective maintenance of apparatus and instruments or refer to appropriate source for repairs
				CO3	Students will be able to develop specialized and interpersonal communication skills with patients, laboratory staffs, other health care authorities, and the community.
13	2	Medical Parasitology	MLS 110	CO1	At the conclusion of the the course, the students will acquire basic knowledge of parasites and its types
				CO2	Students will be able to apply this knowledge to understand the pathogenicity and diagnosis of protozoan parasite infection
				CO3	Students will learn about culture, collection, handling, transportation and examination of clinical samples
14	2	Hematology –II	MLS114	CO1	At the conclusion of the course, Students will be able to define, describe, and evaluate the advanced principles of hematology as it relates to white blood cells and platelets development and maturation.
				CO2	Students will be able to compare and contrast the requirements mandated by the blood coagulation test, hemostasis techniques and other safety protocols applicable to the hematology laboratory.
				CO3	Students will be able to compare and contrast the primary and secondary disorders of hemostasis and the laboratory tests used to identify them
15	2	Human Anatomy & Physiology II	MLS118	CO1	At the conclusion of the course, Students will be able to understand the homeostatic mechanisms and altered physiology of Nervous system.
				CO2	Students will be able to understand the homeostatic mechanisms and altered physiology of endocrine and urinary system
				CO3	Students will be able to understand the homeostatic mechanisms and altered physiology of reproductive system
16	2	Communication Skills-II	ENG 114	CO1	At the conclusion of the course; students will have fairly good proficieny in reading comprehension
				CO2	Students will have enhanced writing skills and have command in official/corporate communication
				CO3	Students will develop confidence in making presentation; oral or documentary
17	2	Biochemistry I Practical	MLS104	CO1	At the conclusion of the course, students will be able to understand the basic laboratory practices in biochemistry
				CO2	Students will apply this knowledge for the preparation of common anticoagulants used in laboratory
				CO3	Students will be able to evaluate the qualitative analysis of biomolecules.
				CO4	Students will be able to analyze the processes of investigation and hypothesis testing.
18	2	Basics of Medical Laboratory Technology Practical	MLS 108	CO1	At the conclusion of the course, students will be able to recognize factors that affect laboratory procedures and results
				CO2	Students will be able to perform preventive and corrective maintenance of equipment and instruments or refer to appropriate source for repairs.
				CO3	Students will learn the calibration of volumetric glassware's
				CO4	Students will be able to comply with safety regulations and universal precautions.

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19	2	Medical Parasitology Practical	MLS 112	CO1	At the conclusion of the course, students will be able to understand the basic laboratory practices in Parasitology
				CO2	Students will be able to apply the knowledge for the isolation of parasites by various concentration methods
				CO3	Students will be able to perform the examination of blood and stool samples for diagnosis of disease.
20	2	Hematology-II Practical	MLS116	CO1	At the conclusion of the course students will be able to perform basic steps for drawing a blood specimen by different methods
				CO2	Students will be able to associate and contrast hematology ethics below standard and abnormal circumstances
				CO3	Students will be able to perform and elucidate principles and procedures of tests to include causes of error and clinical consequence of results
21	2	Human anatomy & Physiology – II Practical	MLS 120	CO1	At the conclusion of the course, students will be able to understand the basic components of anatomy & physiology of animals with special reference to human beings.
				CO2	Students will be able to understand and learn about various tissue systems and organ systems in animals.
				CO3	Students will be able to explain the gross morphology, structure and functions of various organs of the human body.
22	2	Communication Skills-II Lab	ENG 116	CO1	At the conclusion of the course; students will have fairly good proficieny in reading comprehension
				CO2	Students will have enhanced writing skills and have command in official/corporate communication
				CO3	Students will develop confidence in making presentation; oral or documentary
23	3	Biochemistry II	MLS 201	CO1	Students will be able to understand the vital biochemical principles, such as the function of biomolecules and the regulation of biochemical progressions
				CO2	Students will be able to apply this knowledge to describe the synthesis of proteins, lipids, nucleic acids, and carbohydrates
				CO3	Students will be able to analyze the role of biomolecules in metabolic pathways.
24	3	Systematic Bacteriology	MLS 205	CO1	Students will be able to understand the characteristics of bacterial cells, cell organelles, cell wall composition and various appendages like capsules, flagella or pili
				CO2	Students will be able to differentiate a large number of common bacteria by their salient characteristics & classify bacteria into groups.
				CO3	Students will apply the knowledge to identify diseases, its diagnosis and predict the treatment plan
25	3	Basics of Biochemical & biophysical techniques	MLS 209	CO1	At the conclusion of the course students will be able to monitor quality control within predetermined limits.
				CO2	Students will accomplish precautionary and counteractive care of equipment and apparatuses suitable source for maintenance.
				CO3	Students will demonstrate the use of different techniques like spectrophotometry, flame photometry, AAS, centrifugation, radioisotopes techniques and electrophoresis etc.
26	3	Environmental Science	EVS 001	CO1	At the conclusion of the course, students will critically examine all sides of environmental issues and apply understanding from disciplines such as history, economics, psychology, law, literature, politics, sociology, philosophy, and religion to create informed opinions about how to interact with the environment on both a personal and a social level.
				CO2	Students will be able to suggest ways for hygiene, reduce, reuse, recycle and takes care of different living beings (plants, animals, and the elderly, differently abled people), resources (food, water, and public property) .
		Biomedical Waste Management	MLS213	CO1	At the conclusion of the course, students will be able to define & classify Biomedical waste.
				CO2	Students will learn about segregation, collection & transportation of Biomedical Waste.
				CO3	Students will be able to manage different types of Biomedical Waste

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27	3			CO4	At the conclusion of the course, students will be aware about modern technologies used in Handling & Management of biomedical waste.
28	3	First Aid	MLS215	CO1	At the conclusion of the course, students will be able to learn about First-Aid for Respiratory & Cardiac Conditions.
				CO2	Students will be familiar about wounds & injuries & their Management & dressings.
				CO3	Students will be able be familiar about First Aid for Fractures and Dislocation
29	3	Biochemistry -II Practical	MLS 203	CO1	At the conclusion of the course, Students will understand the basic laboratory practices in biochemistry
				CO2	Students will apply this knowledge to quantify various biomolecules
				CO3	Students will be able to evaluate the laboratory samples for clinical diagnosis
				CO4	Students will be able to correlate the laboratory test results with common diseases or conditions.
30	3	Systematic Bacteriology Practical	MLS 207	CO1	At the conclusion of the course, students will be able to understand the basic laboratory practices in the field of bacteriology
				CO2	Students will apply this knowledge to isolate the pathogens from different types of samples such as blood, urine, Sputum and Pus
				CO3	Students will be able to perform antibiotic sensitivity test and other serological test for the detection of pathogen
				CO4	Students will be able to evaluate the laboratory results to clinical diagnosis and analyze the test results with common diseases or conditions.
31	3	Basics of Biochemical & biophysical techniques Practical	MLS211	CO1	At the conclusion of the course, students will be well versed with the principle, working & maintenance of different techniques such as spectrophotometer, colorimeter, flame photometer, electrophoresis and centrifuges.
				CO2	Students will be able to prepare polyacrylamide gel and perform SDS-PAGE
32	3	Basics of Computers Practical	CSE 213	CO1	At the conclusion of the course, students will acquire knowledge of the fundamental concepts of computers
				CO2	Students will be familiar with operating systems, programming languages, peripheral devices, networking, multimedia and internet
				CO3	Students will understand binary, hexadecimal and octal number systems and their arithmetic
33	4	Clinical Biochemistry-I	MLS 202	CO1	At the conclusion of the course, students will learn the principles and assessment of Liver function test, gastic test and renal functional test
				CO2	Students will understand the routine biochemical investigation and metabolic disorders associated with electrolyte imbalance
				CO3	Student can demonstrate the mechanisms and significance of enzyme assays
34	4	Hematology - III	MLS206	CO1	At the conclusion of the course, students will be familiar with principles, procedure, normal value and clinical significance and other safety protocols applicable to the hematology laboratory.
				CO2	Students will be able to interpret laboratory results for hematology testing and classify them as normal or abnormal.
				CO3	Students will understand the immunohematology principles and bone marrow examination
35	4	Immunology and Mycology	MLS210	CO1	At the conclusion of the course, students will be able to outline, compare and contrast the key mechanisms and cellular players of innate and adaptive immunity and how they relate
				CO2	Students will be able to apply this knowledge to identify the mechanisms of inflammation, Antigen- Antibody interactions.
				CO3	Students will be able to understand the concept of mycology (fungi)
				CO4	Students will be able to apply the knowledge to understand the pathogenesis of fungi, etiological agents and the chief infectious diseases.
				CO1	At the conclusion of the course, students will be able to explain the theoretical background to tissue fixation, tissue processing, microtomy and staining using routine and specialised techniques

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36	4	Histopathology & Histopathological Techniques	MLS214	CO2	Students will be able to illustrate the pathological condition of tissue and relate it with diseased condition
				CO3	Students will identify and explain the causes of technical defects in histological preparations,and rectify such defects and know its influence on the diagnostic process
37	4	Basics of Virology	MLS218	CO1	At the conclusion of the course, students will have basic knowledge of virology and able to differentiate types of viruses
				CO2	Students will be able to apply this knowledge to understand the mode of infection
				CO3	Students will be able to analyze the role of molecular techniques to identify diseases and its diagnosis
				CO4	Students will learn about culture, collection, handling and transport of clinical samples
38	4	Applied Bacteriology	MLS220	CO1	At the conclusion of the course, students will learn applications of Microbiology such as Microbial Pathogenicity & Laboratory diagnosis of various infective syndromes
				CO2	Students will be able to demonstrate Antibiotic susceptibility testing in bacteriology.
				CO3	Students will have knowledge about the collection, transportation and processing of bacteriological examination of water, milk, food, air samples & methods to preservation of microbes.
39	4	Introduction To Healthcare Delivery System	MLS224	CO1	At the conclusion of the course, students will acquire knowledge about national policies relating to healthcare
40	4	Medical Terminology and Medical Records	MLS226	CO1	At the conclusion of the course, students will acquire knowledge of the terminology used by various domain doctors and practioners for the diagnosis, treatment of disease.
				CO2	Students will understand the importance of medical records
41	4	Clinical Biochemistry-I Practical	MLS204	CO1	At the conclusion of the course, students will be able to carry out sample collection & specimen labeling of clinical samples
				CO2	Students will be able to perform the clinical biochemical analysis of biological fluid samples.
				CO3	Students will be able to differentiate between normal and diseased condition based on biochemical analysis
42	4	Hematology - III Practical	MLS208	CO1	At the conclusion of the course, students will be familiar with the mechanism of ABO grouping and Rh typing
				CO2	Students will learn blood collection & preservation using different anticoagulants & preservative solutions
				CO3	Students will be able to investigate blood and perform special hematological tests
43	4	Immunology & Mycology Practical	MLS212	CO1	At the conclusion of the course, students will be able to understand the basic laboratory practices in the field of immunoserology and mycology
				CO2	Students will be able to understand the concepts of antigen-antibody interaction via various immunological techniques for the diagnosis of disease
				CO3	Students will be able to apply this knowledge to understand the process of cultivation and identification of fungi on different medium from different samples
44	4	Histopathology & Histopathological Techniques Practical	MLS216	CO1	At the conclusion of this course, students will be able to perform the basic steps of tissue processing
				CO2	Students will understand the various methods of preparation of tissue sections, Paraffin section, celloidin embedding, frozen section
45	4	Applied Bacteriology Practical	MLS222	CO1	At the conclusion of the course, students will understand the basic laboratory practices in the field of bacteriology
				CO2	Students will be able to perform antibiotic susceptibility testing of clinical isolates by using standard method.
				CO3	Students will learn collection, transportation and processing of various clinical samples & preservation of isolates.
				CO1	At the conclusion of the course, students will be able to understand the concepts of various biological fluids for determining the proper functioning of the system

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46	5	Clinical Biochemistry –II	MLS 301	CO2	Students will apply this knowledge to understand the mechanism of metabolic errors and electrolyte imbalance
				CO3	Students will analyze the processes of investigation and hypothesis testing.
				CO4	Students will evaluate the clinical significance of enzymes to rule out the disorders
47	5	Cellular and Histopathology	MLS 305	CO1	At the conclusion of the course, students will be able to define the Cell injury, adaptations and cell death
				CO2	Students will understand the Cellular and systemic Pathology of digestive glands, Cardiovascular diseases, Diseases of respiratory organs, Diseases of urinary system
				CO3	Students will be able to define the Reproductive disorders, Neural disorders, Endocrine disorders
48	5	Blood Banking and Transfusion Reactions	MLS 309	CO1	At the conclusion of the course, students will become familiar with standard transfusion facility protocols and procedures in a fashionable blood bank and transfusion service.
				CO2	Students will learn about the importance and requirements of blood donation and learn about the principle and practices of blood transfusion.
				CO3	Students will learn how to maintain records and compatility testing and about the reaction during the blood transfusion reaction.
49	5	Health Systems and Laboratory Management	MLS 313	CO1	At the conclusion of the course, students will become aware about the principles and standards of clinical laboratory.
				CO2	Students will learn about the health and health related programs runs by the government.
				CO3	Students will become aware about the ethics in medical laboratory practice.
50	5	Endocrinology and Toxicology	MLS315	CO1	At the conclusion of the course, students will gain knowledge about hormones, its classification and mode of action
				CO2	Students will understand the mechanism of hormonal secretion and disorders associated with hormonal imbalance
				CO3	Students will acquire knowledge about various poisoning/ toxic material and their clinical diagnosis.
51	5	Histotechnology and Cytology	MLS 317	CO1	At the conclusion of the course, the students will understand the basics of cell, its components and their functions
				CO2	Students will be able to demonstrate the routine cytological preparation and their routine and special staining techniques
				CO3	Students will be able to apply the knowledge to differentiate normal and abnormal cells
52	5	Generic skills and Entrepreneurship	COM317	CO1	At the conclusion of the course, students will be able to explain the importance of generic skills
				CO2	Students will Demonstrate self development
				CO3	Students can manage himself/herself physically, intellectually and psychologically
53	5	Clinical Biochemistry - II Practical	MLS 303	CO1	At the conclusion of the course, students will be able to understand the basic laboratory practices in the field of biochemistry
				CO2	Students will apply this knowledge to collect various clinical specimens such as: urine, blood, gastric juice etc.
				CO3	Students will perform accuracy, precision and quality control
54	5	Cellular and Histopathology Practical	MLS 307	CO1	At the conclusion of the course, students will be able to differentiate pathological conditions of Necrosis and apoptosis, Inflammation and Foot and hand gangrene
				CO2	Students will be familiar with the diseases of different systems such as Cardio Vascular System, Respiratory System, Digestive System, Reproductive system & Breast
55	5	Blood Banking and Transfusion Reactions Practical	MLS 311	CO1	making about testing achieved in a contemporary blood bank and transfusion service.
				CO2	Student can collect blood & preserve using different anticoagulants& preservative solutions
				CO3	Students will gain expertise about component preparation, ABO grouping, Rh typing
				CO1	At the conclusion of the course, students will be able to prepare smear and slides for cytological testing

56	5	Histotechnology and Cytology Practical	MLS 319	**CO2**	Students will be able to perform specialised staining of cytological samples
				CO3	Students will be able to interpret laboratory results and able to differentiate between malignant and benign tumours
57	6	Professional Training	MLS 302	**CO1**	At the conclusion of the course, the studnets will gain confidence at the workplace and have fruitful interaction with the
				CO2	It also increases the thinking horizon by helping one arrange different kinds of activities at the workplace for all the
				CO3	There is another section of a workplace that can be targeted, i.e. behavioural problems.

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B.Sc

SANT BABA BHAG SINGH UNIVERSITY, KHIALA -1430030, JALANDHAR	
Institute Name: UIS	
Department Name: LIFE SCIENCES AND ALLIED HEALTH SCIENCES	
Programme Name: B.Sc. MEDICAL	
Number of Semetsers- 6	
Vision:	**To bridge the gap between demand and supply for Life Science and Allied Health Professionals with grooming young generations along with their moral and spiritual development.**
Mission:	**To radiate the knowledge of Life Science and Allied Health Science through quality education by using latest technology, modern infrastructure and the framework needed for the development of professionals.**
Details of Programme Educational Objectives,Program Outcomes,Program Specific Outcomes	
PEO of B.Sc. Medical	
PEO1	To provides a hands-on experience of the latest techniques that are in current usage both in the advanced research laboratories and in Industry.
PEO2	To improves critical and analytical abilities.
PEO3	To inculcates scientific ideas in the students for new discoveries in the fields of the biological sciences.
PEO4	To facilitate higher education and professional skills amongst students
Program Outcomes	
PO1	Apply the knowledge and skills appropriate to discipline for the advanced research.
PO2	Develop competency to think creatively, critically and objectively with core and inter-disciplinary excellence.
PO3	Have collaborative and multidisciplinary skills to work as an effective member or leader to achieve goals.
PO4	Be the government professionals, scientists, and mentors of the future.
PO5	After graduating, B.Sc. Medical students will have a lot of opportunities in higher studies in the field of Botany, Zoology, Chemistry, Biotechnology, Microbiology, Genetics, and Forestry etc. if they opt for teaching and research as a goal of their career.
PO6	They will be eligible for various competitive exams like civil services and other public undertakings.
PO7	Students will be able to identify various types of plants of economic interest and wild animals in different vegetation rich zones. They will be quite familiar with various methods to protect and conserve the biodiversity and would be competent enough to spread awareness among people to save the environment.
PO8	Students get an exposure in the field of Apiculture, Sericulture, Pisciculture, etc.
PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	Graduates will be able to explain how organisms function at the level of gene, genetic data, cells, tissues, organ and organ system level..
PSO2	Graduates will be able to understand the physiological adaptations, development, reproduction and diversity of different forms of life.
PSO3	Graduates will understand the different morphological features of animals & plants. They will also understand the genetics and variations of different organisms.
PSO4	Graduates will be able to understand chemical nomenclature, classification, structure and reactivity of organic and inorganic matter .
PSO5	Giving opportunities to student to conduct experiments practically both in field and laboratory. Hands on practical helps the students to gain proficiency and skills in different topics of modules offered to them.

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Life Sciences and Allied health Sciences

B.Sc. Medical

S. No.	Semester	Course Name	Course code		Course outcomes
1	1	Plant Biodiversity	BOT101	CO1	
				CO2	Understanding aboutthe diversity, distribution, ecology life cycle and economic importance of algae
				CO3	Understanding aboutthe diversity, distribution, ecology life cycle of some genera of fungi, symbiotic association like lichens, mycorhizza and their significance
				CO4	Understanding aboutthe diversity archaegoniates (Bryophytes, Pteridophytes, and Gymnosperm) their distribution, morphology, anatomy, ecology, life cycle and economic importance
2	1	Atomic Structures , Bonding , General Organic Chemistry and Aliphatic Hydrocarbons	CHM101	CO1	Solve the conceptual questions using the knowledge gained from quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves, shapes of s, p, and d orbitals, and periodicity in atomic radii, ionic radii, ionization energy. and electron affinity of elements.
				CO2	Draw the plausible structures and geometries of molecules using Radius Ratio Rules, VSEPR theory and MO diagrams.
				CO3	Able to explains significance of quantum numbers , de-Broglie's dual behaviour of matter and Heisenberg's uncertainty principle and solve numerical problems.
				CO4	Understand and explain the different nature and behavior of organic compounds and able to analyse and evaluate fundamental concepts of stereochemistry
3	1	Animal Biodiversity	ZOO101	CO1	Understand the evolution, history of phylum that help in furthur research work.
				CO2	Understand the economical importance of different classes.
				CO3	Understand the conceptual knowledge of invertebrates, their adaptations and associations in relation to their environment
				CO4	Imparts conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment
				CO5	Learn about their characters of different phylum and classes with examples and their unique features in detail.
4	1	GENERAL ENGLISH-I	ENG101	CO1	Students will heighten their awareness of correct usage of English grammar in writing and speaking.
				CO2	Students will improve their speaking ability in English both in terms of fluency and comprehensibility.
				CO3	Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading & listening.
5	1	Atomic Structures , Bonding , General Organic and Chemistry and Aliphatic Hydrocarbons	CHM 103	CO1	
				CO2	Detection of elements (N, S and halogens) in organic compounds, Detection of functional groups
				CO3	Identify amino acid & sugars through chromatographic methods
6	1	History and Culture of Punjab -I	HCP101	CO1	The Student will acquire the knowledge about Punjab and its Historical Resources.
				CO2	The Student will understand the Harppan Culture and different Vedic Periods.
				CO3	The Students will analyze the Alexander's invasions
7	1	Plant Biodiversity Practical	BOT103	CO1	Student will know about the structure of irus and bacteriophages
				CO2	Student will aware about the structure and life cycles of Algae, fungi by preparing temporary and permanent slides
				CO3	Student will learn about the various forms of Lichens by watching the specimens and live samples
				CO4	Student will learn about the morphological structure, anatomy and reproductive structure of Byryophytes, Ptridophytes and Gymnosperms by watching the specimes of organism, live or preserved and by section cutting and experiencing the anatomical structure in microscope.
8	1	Animal Biodiversity Practical	ZOO103	CO1	Able to comparing and contrasting structural features in members of different animal phyla.
				CO2	Learn about information gathering, collation and organisation suitable for the preparation of a scientific report.
				CO3	Learn about how to identify the organisms on the basis of their external characters.
				CO4	Able to memorize the taxonomic classification and scientific names of the specimens.
				CO5	Able to prepare a animal album with all details.
9	2	Plant Ecology and Taxonomy	BOT102	CO1	Students will understand the basics of ecology with its ineraction of biotic and abiotic components.
				CO2	Understand the energy flow, trophic system and biogeochemical cycle operating in the ecosystems
				CO3	learn about the plant taxonomy, identification keys, herbarium and its function
				CO4	Learn about the various principle and rules of ICBN, Binomial systems classification of angiosperms and few important families of the plants
		Chemical Energetic		CO1	Acquire the knowledge of thermodynamic property of any system ,Chemical & Ionic equilibria of various systems.

Dr Shweta (COD)

Dr. Vikas Kumar Dhama

10	2	Equilibrium and Functional Group Organic chemistry – I	**CHM 102**	CO2	Apply the concepts of concept of ionization of electrolytes with emphasis on weak acid and base and hydrolysis of salt, pH and electrolytes.
				CO3	Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.
				CO4	Use the synthetic chemistry for functional group transformations & to propose plausible mechanisms for any relevant reaction.
11	2	Comparative Anatomy and Developmental Biology of Vertebrates	ZOO102	CO1	Figure out how to utilize the near strategy to examine and basically assess the structure and capacity of vertebrate frameworks. This data will empower you look at the developmental history of vertebrate species and evaluate the practical importance of morphological adjustments.
				CO2	Comparative animal physiology is a comprehensive subject that gives in depth knowledge of various physiological processes in the animal kingdom
				CO3	students gain knowledge about the comparative physiological concepts of nutrition digestion respiration excretion metabolism and osmoregulation.
				CO4	Gains knowledge about gametogenesis, cleavage mechanisms, gastrulation and role of hormones in metamorphosis and regeneration
				CO5	Understand the basic concepts of developmental biology
12	2	General English-II	ENG102	CO1	Students will improve their speaking ability in English both in terms of fluency and comprehensibility.
				CO2	Students will increase their reading speed and comprehension of academic articles.
13	2	History And Culture Of Punjab –II	HCP102	CO1	The Student will acquire the knowledge Of Mauryan Empire.
				CO2	The Student will understand the impact of Buddhism & Jainism on Punjab.
				CO3	To aware the learners Depiction of Punjab in the accounts of Chinese travelers.
14	2	Plant Ecology and Taxonomy Practical	BOT104	CO1	Aquantence of principle and use various instruments used in the study of the ecology
				CO2	Learn about the analysis of various physic chemical parameters of soil
				CO3	Learn about the morphological adaptaion of some special plants in different habitat
				CO4	Learn about the quantitative analysis of plant species diversity by using quadrat methods
				CO5	Learn about the classification of angiosperms and some families by observing the common members available for the experiment
15	2	Chemical energetic, Chemical Equilibrium and Functional Group organic chemistry-I	CHM 104	CO1	Acquire basic concepts of thermochemistry.Analyse thermodynamic parameters of solutions and salt mixtures.
				CO2	CO2 Find out the acidity, Basicity and pKa Value on pH meter.
				CO3	CO3 Accurately evaluate separation, purifications techniques, of organic compounds.
16	2	Comparative anatomy and developmental biology of vertebrates practical	ZOO104	CO1	Figure out how to utilize the similar technique to break down and fundamentally assess the structure and capacity of vertebrate frameworks.
				CO2	Build up the abilities important to extensively evaluate the huge decent variety of vertebrates, both living and wiped out, and to think critically about the proposed connections between gatherings.
				CO3	Understand about the placenta and its functions.
				CO4	Understand about the reproduction and reproductive organs.
17	3	Anatomy and Embryology of Angiosperms	BOT201	CO1	Learn about the basic body and its parts of flowering plants
				CO2	Learn about the shoot and root apical meristem, cambium and secondary growth and its significance in the plant development.
				CO3	Learn about the diversity of plants and leaf origin and development
				CO4	Learn about the various methods of propagation of plant and development of flower and fruits
18	3	Solutions , Phase Equilibrium, conductance, electrochemistry and functional group organic chemistry-II	CHM201	CO1	Acquire coherent knowledge of solutions, phase equilibrium and conductance
				CO2	Learn the working of electrochemical cells, EMF & pH determination.
				CO3	Understand structure and bonding in carboxylic acids and amine derivatives &Use the synthetic chemistry for functional group transformations.
				CO4	Identify & Analyse structural components, configuration of amino acids, proteins and Carbohydrates
19	3	**Animal Physiology and Biochemistry**	ZOO201	CO1	Understand the deep concepts of assimilation, breath, excretion the functioning of nervous system and muscles
				CO2	Interactions and interdependence of physiological and biochemical processes.
				CO3	Students gain fundamental knowledge of animal physiology
				CO4	Understand the concept of reproduction and Physiology of male and female reproductive system
				CO5	Know about various biochemical pathway
				CO6	Understand the concept of carbohydrates metabolism and protein metabolism
20	3	Environmental Science	EVS001	CO1	Understand the importance of environment in their life.
				CO2	Learn about the concept of Ecosystem.
				CO3	Understand the relation between social issues and environment.
				CO4	Learn how human beings are affected with the pollution.

Dr. Sharma (COD)

Dr. Vikas Sharma Dean

Sant Baba Bhag Singh

21	3	Anatomy and Embryology of Angiosperms Practical	BOT203	CO1	Explain the significance of Photosynthesis and respiration
				CO2	Assess dormancy and germination in plants
				CO3	Qualitative and quantitative determination of amino acids
22	3	Solutions , Phase equilibrium, Conductance, Electrochemistry and Functional Organic Chemistry-II (Practical)	CHM 203	CO1	demonstrate and calculate various parameters ofdistribution & phase equilibria
				CO2	Calculate molar and normal solution of various concentrations.
				CO3	perform and evaluate outcomes of conductometric & potentiometric titrations.
				CO4	Study Qualitative Organic Analysis & biochemical analysis of amino acids & carbohydrates
23	3	Animal Physiology and Biochemistry Practical	ZOO203	CO1	Knowledge in the fundamentals of biochemistry of all the biomolecules like the carbohydrates,proteins,lipids,nucleic acids,their classification structure and metabolism.
				CO2	Understudies will pick up ability to execute the jobs of a science educator or clinical lab specialists with preparing as they have essential things.
				CO3	Get information about the blood clotting and bleeding time.
				CO4	Understand the concept of ABO blood group.
24	4	Plant Physiology and Metabolism	BOT202	CO1	Plant water realrtion and mineral nutrition absorption process
				CO2	Translocation of sap and Photosynthesis process in different types of plants
				CO3	Carbohydrate and Nitrogen metabolism in Plants
				CO4	Enzymes and various phases of plant development such as seed dormancy, germination and plant movement
				CO5	Plant response to light and its effect in the devepopment of plants
25	4	Transition Metal & Coordination Chemistry, States of Matter and Chemical Kinetics	CHM 202	CO1	Understand the terms, ligand, denticity of ligands, chelate, coordination number and use standard rules to name coordination compounds.
				CO2	Explain the meaning of the terms Δo., Δt, pairing energy, CFSE, high spin and low spin and magnetic properties and colour of complexes on basis of Crystal Field Theory
				CO3	Derive mathematical expressions for different properties of gas, liquid and solids and understand their physical significance.
				CO4	Have understanding of rate law and rate of reaction, theories of reaction rates and catalysts
26	4	Genetics and Evolutionary Biology	ZOO202	CO1	Students will understand the concept of mendels laws in genetics, inheritance law and central dogma in biology.
				CO2	Understanding of genetic basis of evolution, human karyotyping and speciation
				CO3	Students learn the concepts of ductless gland or endocrine system
				CO4	Understand about the evolutionary theories and evolutionary change
27	4	Plant Physiology and Metabolism Practical	BOT204	CO1	Various plants physiological processes with the help of experiments
				CO2	Study and calculation of stomatal index
				CO3	Impact of light on chlorophyll and phytochrome pigment
28	4	Transition Metal & Coordination Chemistry, States of Matter and Chemical Kinetics (Practical)	CHM204	CO1	Analyse and estimate Qualitative analysis of inorganic cations & anions.
				CO2	Calculate viscosity and surface tension of different liquids and solutions.
				CO3	Understand and apply gravimetric analysis and complexometric titrations.
				CO4	Derive mathematical expressions of chemical kinetics methods.
29	4	Genetics and Evolutionary Biology Practical	ZOO204	CO1	Gains knowledge about gamete formation, cleavage , gastrula formationn and role of hormones in metamorphosis and regeneration in organisms.
				CO2	Gets knowledge about Linkage, recombination and gene mapping .
				CO3	Gain knowledge about human karyotypes.
				CO4	Understand the concept of phylogeny.
				CO5	Knows the difference between homology and analogy
	Skill Enhancement Course				
30	3	Medicinal Botany	BOT 205	CO1	Scope and importance of medicinal plants and traditional medical systems in India
				CO2	Conservation of endangered and endemic plants their use in ethnobotany.
				CO3	Propagation of medicinal plants, objective of nursery
				CO4	Use of Ethnobotany and folk medicine in India and application of natural products for curing some diseases

Dr. Shweta (COD)

Dr. Vikas Sharma Dean

31	3	Medical Diagnostics	ZOO205	CO1	Students will able to diagnose the different symptoms of the diseases in family members and relatives and able to provide them a advice to consult a doctor.
				CO2	Students understands the some lab techniques related to blood.
				CO3	Gets the knowledge regarding different types of tumours
				CO4	Understanding of PET scan, MRI,CT scan and X-Rays.
				CO5	Students will learn about infectious and non infectious diseases along with theirs types and symptoms.
32	3	Basic Analytical Chemistry	CHM 209	CO1	Handle analytical data &Expresses the role of analytical chemistry in science.
				CO2	Determine composition and pH of soil, which can be useful in agriculture
				CO3	Do qualitative and quantitative analysis of water, food adultrants & cosmetics
				CO4	Estimate macro nutrients using Flame photometry & Separate mixtures using separation techniques
33	4	Floriculture	BOT206	CO1	The history, importance and scope of gardening in India
				CO2	Nursery management and routine gardening operation
				CO3	Various types of ornamental plants and their propatgation in different gardens area
				CO4	Various types of gardens in the world and landscaping design in public areas
				CO5	Cultivation of commercial flowering plants
34	4	Green Methods in Chemistry	CHM 210	CO1	Understand the twelve principles of green chemistry and will build the basic understanding of toxicity,hazard and risk of chemical substances.
				CO2	Analyze a process and identify parameters that make environmentally friendly/sustainable/green.
				CO3	Learn to design safer chemical ,products and processes that are less toxic,than current alternatives.
				CO4	Appreciate the use of green chemistry in problem solving skills, critical thinking and valuable skills to innovate and find out solution to environmental problems.
35	4	Ethnobotany	BOT204	CO1	Concept, scope and importance of ethnobotany
				CO2	Knowledge about various ethnic gtribals groups and use of plants in their daily life style
				CO3	Filed work, collection of plants and herbarium preparation,
				CO4	Knowledge about plant sources of various modern drug and their conservation by ethnic tribal people
				CO5	Legal aspects of ethnobotany, Biopiracy, IPR and Traditional Knowledge.
36	5	Apiculture and Sericulture	ZOO315	CO1	Understand different honey bee species, their behavior and different bee products ,
				CO2	CO2. Understand different silk worm species, life cycle of silkworm and sericulture in detail.
				CO3	CO3.Able to understand the diseases and pest of bees and silkworms.
37	5	Aquatic Biology	ZOO317	CO1	Understand the ecology and behavior of plants, animals, and microbes living water.
				CO2	Basic oceanography to understand influence of unique characteristics of marine environments on marine life.
				CO3	Quantitative approaches to collecting and understanding information.
				CO4	Collaboration to work together effectively in teams to solve problems
38	5	Fuel chemistry	CHM 313	CO1	Understanding of both conventional petroleum-based fuels, and alternative & renewable fuels, including gaseous fuels.
				CO2	understand the refining processes used to produce fuels and lubricants and their usage in different applications.
				CO3	Analyze origin of petroleum, crude oil, composition, different refining processes employed industrially to obtain different fractions of petroleum.
				CO4	Catagorize alternative and renewable fuels like Biofuels (Different generations), Gaseous Fuels (e.g. CNG, LNG, CBG, Hydrogen etc.).
				CO5	Apply various test methods used to qualify different types of fuels as well characterization methods.
39	6	Mushroom Culture Technology	BOT310	CO1	Various types of edible and poisionous mushrooms available in india
				CO2	Cultivation of mushroom and preparation of low cost composting material for mushroom cultivation
				CO3	Storage of mushroom and their post harvesting till marketing
				CO4	Mushroom research centers, and their marketing
40	6	AQUARIUM FISH KEEPING	ZOO314	CO1	Students will learn about the how to maintain aquarum and different types of fishes.
				CO2	Get knowledge about feeding habits of fishes.
				CO3	Learn about fishes transportation
41	6	Pharmaceutical Chemistry	CHM318	CO1	Gain insight into retro-synthesis approach in relation to drug design and drug discovery.
				CO2	Learn synthetic pathways of major drug classes.
				CO3	Understand the fermentation process and production of ethanol, citric acids, antibiotics and some classes of vitamins.

Discipline Elective Courses

Dr. Shweta (COI)

Dr. Vikas Sharma Dean

42	5	Cell and Molecular Biology	BOT301	CO1	Various types of equipments, their principles and application for studing plants development, physiology and functions
				CO2	Basic structure of plant cell, cell wall and organelles
				CO3	Structure of chloroplast, golgi bodies, ER, mitochondria and nucleus
				CO4	Cell cycle, Structure of DNA, DNA replication, translation and transcription
43	5	Cell and Molecular Biology Practical	BOT303	CO1	Structure of bacteria, virus, prokaryotic and eukaryoitic cells through various types microscopy
				CO2	Structure of plant cells by preparing temporary mounts
				CO3	Study of mitosis and meosis through preparation of temporary slides
				CO4	Study of various physiologuical processes through experiments
				CO5	Measurement of cell size with the help of micrometry
44	5	Analytical Techniques in Plant Sciences	BOT305	CO1	Principle and functions of various types of microscopes
				CO2	CO2. Principle and functions of centrifuge and spectroscopy
				CO3	CO3. Concept and use of radioisotopes in biological studies
				CO4	CO4. Characterization of protiens and nucleic acids
				CO5	CO5. Use of biostatics in plant sciences
45	5	Analytical Techniques in Plant Sciences Practical		CO1	Different tyoes of chromatography used to study plant's structure and functions by performing exepriments
				CO2	Use of blotting techniques to transfer DNA, RNA and Protiens
				CO3	Use of centrifuge in the separation of biomolecules in plants
				CO4	Use of different microscopic techniques to study plant structure.
46	5	Cell Biology, Biotechnology and Reproductive Biology	ZOO301	CO1	To enable the students to learn various aspects of cell biology
				CO2	To aware the students about various reproductive processes and the modern techniques to assist these.
				CO3	Students will aware about techniques of biotechnology.
				CO4	Students will learn about the molecular tools and different techniques used in biotechnology
				CO5	Able to understand the concept of male and female reproductive system.
				CO6	Students will aware about different reasons of infertility,reproductive health and different Assisted Reproductive Technology
47	5	Cell Biology, Biotechnology and Reproductive Biology Practical	ZOO303	CO1	Students will learn about the cell cycles.
				CO2	Able to perform different blood tests like WBC,RBC count, Hb estimation,blood clotting ,Bleeding time
				CO3	Able to perform Erythrocyte sedimentation rate
				CO4	Able to understand the male and female reproductive system in details with the help of permanent slides.
48	5	Applied Zoology Practical	ZOO307	CO1	Get knowledge about parasitic helminthes and Study of arthropod vectors associated with human diseases
				CO2	Students will learn about insects that damage crops.
				CO3	Identification points of different crop insects.
				CO4	Learn about maintenance of freshwater aquarium.
49	5	Aquatic Biology	ZOO309	CO1	Students will learn about aquatic biomes
				CO2	Gain knowledge about freshwater biology.
				CO3	Students will understand about nutrient cycle in lakes.
				CO4	Get knowledge about management of aquatic Resources.
50	5	Aquatic Biology Practical	ZOO311	CO1	Students will learn about aquatic biomes
				CO2	Gain knowledge about freshwater biology.
				CO3	Students will understand about nutrient cycle in lakes.
				CO4	Get knowledge about management of aquatic Resources
	5	Organometallics, Bioinorganic Chemistry, Polynuclear Hydrocarbons	CHM305	CO1	Apply 18-electron rule to rationalize the stability of organomettalic compounds
				CO2	Identify important structural features of the of Zeise's salt, metal alkyls tetrameric methyl lithium and dimeric trialkyl aluminium and explain the concept of multicenter bonding in these compounds
				CO3	Diagrammatically explain the working of the sodium-potassium pump in organisms and sources and consequences of excess and deficiency of trace elements

Dr. Shweta (CoD)

Dr. Vikas Physics (DEAN)

51		and UV, IR spectroscopy		CO4	Analyse and elaborate structure & properties of polynuclear hydrocarbons
				CO5	Gain insight into the basic principles of UV, IR spectroscopic techniques & Use spectroscopic techniques to determine structure and stereochemistry of known and unknown compounds.
52	5	Organometallics, Bioinorganic Chemistry, Polynuclear Hydrocarbons	CHM307	CO1	Interpret the structures of various complexes and understand their properties.
				CO2	Impart knowledge about handling the spectrophotometer and carry out qualitative &quantitative analysis
				CO3	Employ spectroscopy for characterization of metal complexes and organic compounds
53	5	Industrial Chemical and Environment	CHM309	CO1	Understand the vital role played by chemistry in industry.
				CO2	Give solution based on chemical knowledge in the field of various industries such as manufacturing processes, handling and storage of inorganic chemicals & hazardous effects of the inorganic chemicals.
				CO3	Composition of air, various air pollutants, effects and control measures of air pollutants.
				CO4	Different sources of water, water quality parameters, impacts of water pollution, water treatment.
				CO5	Different industrial effluents and their treatment methods.
				CO6	Different sources of energy & generation of nuclear waste and its disposal.
54	5	Industrial chemical and environment (Practical)	CHM311	CO1	Identify and analyse various water quality parameters.
				CO2	Estimate bioindicators of pollution through titrimetrically and spectrophotometrically.
				CO3	Analyse quantitively air,water pollutants.
55	6	Green Chemistry	**CHM 310**	CO1	Understand the twelve principles of green chemistry and will build the basic understanding of toxicity, hazard and risk of chemical substances.
				CO2	Learn to design safer chemical ,products and processes that are less toxic, than current alternatives as well as safer design for accident prevention.
				CO3	Appreciate the use of green chemistry in problem solving skills, critical thinking and valuable skills to innovate and find out solution to environmental problems.
				CO4	Observe the current environmental issues and their appropriate solutions by chemical approach.
56	6	Green Chemistry (Practical)	CHM312	CO1	Apply twelve principles of green chemistry for synthesis and analysis.
				CO2	design safer chemical ,products and processes that are less toxic, than current alternatives
				CO3	Incorporate problem solving skills, critical thinking and valuable skills to innovate and find out solution to environmental problems.
57	6	Analytical Method in Chemistry	CHM314	CO1	Understand basic principle of instrument of various spectrophotometric, electroanalytical and themal methods of analysis
				CO2	Develop experience and knowledge to operate and use effectively the analytical tools and instruments available in laboratory.
				CO3	Understand the significance, quality and limitations of the results produced by various separation techniques.
				CO4	Develop methods of analysis for different samples independently.
58	6	Analytical Method in Chemistry(Practical)	CHM 316	CO1	Perform experiment with accuracy and precision.
				CO2	Perform various types of titrations i.e redox, colorimetric, complexometric and acid- base titration.
				CO3	Determine composition of soil, water analysis, Estimation of macronutrients using Flame Photometery
				CO4	Learn separation of analytes by chromatography.
59	6	Chemistry of Main Group Element, Theories of Acids and Bases	CHM306	CO1	Learn the fundamental principles of metallurgy and understand the importance of recovery of byproducts during extraction.
				CO2	Understand the periodicity in atomic and ionic radii, electronegativity, ionization energy, electron affinity of elements of the periodic table.
				CO3	Understand structure & properties, role of inorganic polymers.
				CO4	Elaborate different acid and base reactions & covalent and ionic bonding using Lewis dot structure.
60	6	Chemistry of Main Group Element, Theories of Acids and Bases(Practical)	CHM308	CO1	Carry out iodometric/iodimetric analysis.
				CO2	Perform and estimate constituent ions through complexometric titrations & gravimetrically
				CO3	Handle and prepare some industrially significant complex salts
	6	Economic Botany and	BOT302	CO1	Core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems
				CO2	The various types of cereal, pulses, spices, oil, brevage, fibre crops, their origin, cultivation and uses

Dr. Shweta (CoE)

Dr. Vibha Sharma (Dean)

61		Biotechnology		CO3	Micropropagation techniques and tissue culture
				CO4	Recombinant DNA Techniques
62	6	Economic Botany and Biotechnology Practical	BOT304	CO1	Wheat, Gram, Soybean, Black pepper, Clove
				CO2	Tea, Cotton, Groundnut through specimens, sections and microchemical tests
				CO3	Tissue culture through photographs: Anther culture, somatic embryogenesis, endosperm and embryo culture; micropropagation
63	6	Bioinformatics	BOT306	CO1	Aim, scope and application of bioinformatics
				CO2	Biological databases and their classification
				CO3	National center for biotechnology information (NCBI), Tools used in bioinformatics such as BLAST, various types of databases
				CO4	DNA DDBJ, PIR. MSA, PAM, Blosum
				CO5	Structural bioinformatics drug discovery, QSAR, Drug designing and crop improvement using bioinformatic's tools
64	6	Bioinformatics Practical	BOT308	CO1	How to use nucleic and protein databses
				CO2	How to retrieve the sequences from the databases
				CO3	Sequence homology and Gene annotation
				CO4	Construction of phylogenetic tree using various software
65	6	Immunology	ZOO302	CO1	Imparts in depth knowledge of tissues, cells and molecules involved in host defense mechanisms
				CO2	Interactions of antigens, antibodies, complements and other immune components.
				CO3	Get knowledge about organs involved in immune response.
				CO4	Understand about the concept of MHC,different pathways of antigen presentation and processing
				CO5	understand the concept of vaccines and hypersentivity
66	6	Immunology Practical	ZOO304	CO1	Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health.
				CO2	Understand the concept of Immunoelectrophoresis
				CO3	Get knowledge about ELISA and its importance
				CO4	Understand the procedure of Chromatography
67	6	Reproductive Biology	ZOO306	CO1	Students will learn about Reproductive endocrinology.
				CO2	Understand about the the male and female reproductive system.
				CO3	Gain knowledge about the Assisted Reproductive Technology.
68	6	Reproductive Biology	ZOO308	CO1	To aware students about the different techniques used in studying various types of cells involved in formation of reproductive organs.
				CO2	Understand about the the male and female reproductive system.
69	6	Insect, Vector And Diseases	ZOO310	CO1	Get knowledge about identification points and features of insects.
				CO2	Students will understand about the relationship between insects and vectors.
				CO3	Gain knowledge about disease causing insects.
70	6	Insect, Vector And Diseases Practical	ZOO312	CO1	Get knowledge about identification points and features of insects.
				CO2	Students will understand about the relationship between insects and vectors.
				CO3	Gain knowledge about disease causing insects.

Dr. Shrivastava
(CoD)

Dr. Vikas Sharma
(Dean)

SANT BABA BHAG SINGH UNIVERSITY, KHIALA -1430030, JALANDHAR	
Institute Name:	**UIS**
Department Name:	**Life science and Allied Health Science**
Programme Name:	**B.Sc Medical Radiology & Imaging Technology/UG028**
Number of Semetsers:	**VI**
Vision:	To bridge the gap between demand and supply for Life Science and Allied Health Professionals with grooming young generations along with their moral and spiritual development.
Mission:	To radiate the knowledge of Life Science and Allied Health Science through quality education by using latest technology, modern infrastructure and the framework needed for the development of professionals.

Details of Programme Educational Objectives,Program Outcomes,Program Specific Outcomes

S.No.		Programme Educational Objective (PEO) (The Graduate/Undergraduate will….)
1	PEO1.	Those who choose this stream are going to study about Radio Imaging Technology, Equipment's, Emergency Care in Radiology etc.
2	PEO2.	Those who get their placement will be known as Radiology Assistants/Technicians & will assist a radiologist in diagnosing various diseases with the help of imaging the body parts by various machines.
3	PEO3	This Program will create a great source of manpower which can aid in our health sector especially in Radiology, Emergency & Operation Theatres.
4	PEO4	Radiology Technologists will provide safe & quality patient care by using their technical & critical thinking while Examining the patient.
5	PEO5	This Program will give students knowledge of basic Science like Anatomy, Physiology, Microbiology& Pathology etc.
		Programme Outcomes (PO)(At the end of Programme/Degree mentioned above , the graduates will be able to ……)

Dr. Shivani (COE)

Dr. Vikas Sharma
(Dean)

PEO,PO,PSO-Radiology

1	PO1.	**Disciplinary Knowledge:** The student has acquired in-depth knowledge of the various theoretical and practical concepts regarding the role of radiographer,technologist and Radiology.
2	PO2	**Critical Thinking:** Critical thinking as an attribute enables a student to identify, formulate and apply knowledge to develop critical thinking and practical understanding in the field of Radiology to find solutions for human benefits.
3	PO3	**Problem Solving:** gain hands on experience in state-of-the-art Radiological equipment that could enrich them to perform high through put research on radiological procedures in field of radio-imaging technology
4	PO4	**Scientific /Analytical Reasoning:** Students learn to investigate, experiments/ theoretical methods, relate information and interpretation of data based on scientific reasoning. The student will be able to draw logical conclusions based on a group of observations, mathematical techniques and measurements
5	PO5	**Multicultural Competence:** The ability to understand and constectively relate to uniqueness of each student in light of diverse cultre that influance in multy prospectives
6	PO6	**Environment & Sustainability:** Student's ability to understand over all goal of conserving natural resourses and create and dovelop energy efficient projects and practice.
7	PO7	**Research related skills & Ethics:** develop the skill to think independently, plan research and execute it in different fields of Radiology. The student is aware of what constitutes unethical behavior-- fabrication, plagiarism and misrepresentation or manipulation of data
8	PO8	**Individual and Team Work:** acquire the ability to function effectively on teams to accomplish a common goal. The student is capable of
9	PO9	**Communication Skills:** Students are incouraged to communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing
10	PO10	**Life long Learning:** students opt for higher studies, jobs in various sectors and entrepreneurship abilities in the field of Radiology
		Programme Specific Outcomes (PSO)
1	PSO1.	Ability to analyze, Monitor & Examine the patient.
2	PSO2.	Understand the fundamentals and applications of Radiology & Emergency Care equipments.
3	PSO3	Ability to have knowledge of BLS & ACLS and ability to deliver it when ever required.
4	PSO4	Ability to Assist a radiologist in diagnosing various diseases with the help of imaging.
5	PSO5	Able to detect any Changes in patient's physiological status & able to tackle all types of Complications.
6	PSO6	Knowledge of Basic Science of Anatomy, Physiology, Pathology & Microbiology etc.

Dr. Shweta (COD)

Dr. Vikas Sharma (Dean)

Programme Name:			B.Sc Medical Radiology & Imaging Technology/ UG028

Details of Course Outcomes ((At the end of course, the graduates will be able to ……)					
S. No	Semester	Course Name	Course Code		Course Outcomes
1	1	Human Anatomy & Physiology-I	RDL101	CO1	To identify and relate basic concepts of structure and function of cells, tissues and organs
				CO2	To understand the anatomical organization, coordination and integrated functions of human body.
				CO3	Able to explain the anatomy, physiology and functions of various organs mentioned in chapters.
				CO4	Able to understand the homeostatic mechanisms and altered physiology of digestive system
				CO5	Apply concepts and knowledge of terminology related to the cardiovascular, digestive system and structure and function of blood and lymphatic system
2	1	Basic Physics including Radiological Physics	RDL105	CO1	The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications.
				CO2	This course also provides fundamental idea about circuit analysis, working principles of machines
				CO3	Study about transformers, basic principles of transformer, along with its uses
				CO4	To study about various rectifiers, p-type and n-type semiconductors
				CO5	Overall Knowledge of units of radiation
3	1	Conventional Radiography and Equipment	RDL109	CO1	The purpose of this course is to provide an understanding of physical concepts and underlying various technologica lapplications
				CO2	This course provides fundamental idea about various radiological equipment's and helpful to tackle complex radiological problems in their chosen area of application.
				CO3	Study about intensifying Screen & Filters: Structure and functions
				CO4	Know about how to control of scattered radiation beam limiting devices ,cones, diaphragms.
				CO5	Understanding about fluorescence and phosphorescence
				CO1	The purpose of this course to know composition of film, screens, cassette, processing solution, the usage and effect of light

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4	1	Radiographic and Image Processing Techniques	RDL113	CO2	Perform best storage guidelines for film storage and handling.Select cassette size, Loading & unloading of films
				CO3	Study about purpose and location of darkroom
				CO4	Study about Image formation.
				CO5	Knowledge about automatic processing
5	1	Human Anatomy & Physiology Lab	RDL103	CO1	Students will be able to learn the basic terminology of anatomy, architecture and functional details of cells, tissues, organs and organ systems.
				CO2	Able to explain the anatomy, physiology and functions of various organs mentioned in chapters
				CO3	Able to understand the homeostatic mechanisms and altered physiology of digestive system.
				CO4	Apply concepts and knowledge of terminology related to the cardiovascular, digestive system and structure and function of blood and lymphatic system
6	1	Basic Physics including Radiological Physics Practical	RDL107	CO1	The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications. This course also provides fundamental idea about circuit analysis, working
				CO2	Understanding the heating effect of current, Ammeter, voltmeter, Galvanometer
				CO3	To study about TLD badges and their uses and relative merits
				CO4	Know about various energy bands in solids, the semiconductor
				CO5	Understand the working of p-n junction diode as rectifier (half- wave and full-wave rectifier).
7	1	Conventional Radiography and Equipment Practical	RDL111	CO1	The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications
				CO2	Understanding the image intensifier, its features, spot film
				CO3	Knowledge about Grids, its features & types.
				CO4	Know about effects of Kv and mAs.
				CO5	Understand the Maintenance of x-ray equipment and accessories
8	1	Radiographic and Image Processing Techniques Practical	RDL115	CO1	The purpose of this course to know composition of film, screens, cassette, processing solution, the usage and effect of light
				CO2	Perform best storage guidelines for film storage and handling. Select cassette size, Loading & unloading of films.
				CO3	Study about Maintenance of processing tank.

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				CO4	Knowledge about Safe light test
9	1	Communication Skills-1	ENG121	CO1	Equip the learner with proficiency in reading comprehension
				CO2	Enable the learner with improved writing skills and command over official/ corporate communication.
				CO3	Enhance the learners' range of vocabulary and knowledge of the essentials of grammar
				CO4	Have fairly good proficiency in reading comprehension
				CO5	Have enhanced writing skills and have command in official/ corporate communication.
				CO6	Develop confidence in making presentation: oral or documentary
10	1	Communication Skills-1 Lab	ENG123	CO1	Equip the learner with proficiency in reading comprehension
				CO2	Enable the learner with improved writing skills and command over official/ corporate communication.
				CO3	Enhance the learners' range of vocabulary and knowledge of the essentials of grammar
				CO4	Have fairly good proficiency in reading comprehension
				CO5	Have enhanced writing skills and have command in official/ corporate communication.
				CO6	Develop confidence in making presentation; oral or documentary
11	2	Human Anatomy & Physiology-II	RDL102	CO1	Understand the homeostatic mechanisms and altered physiology of Nervous system
				CO2	Understand the homeostatic mechanisms and altered physiology of endocrine and urinary system
				CO3	Understand the homeostatic mechanisms and altered physiology of reproductive system
				CO4	Students will learn the concepts of anatomical structures in relationship to their physiological functions
				CO5	They will also learn the integration and coordination of body functions and their dependence on endocrine and nervous system to regulate the physiological activities.
12	2	Clinical Radiography-Positioning Part I	RDL106	CO1	This course is designed to provide the students the basic knowledge in Radiography
				CO2	Study about lower limb–x-ray positioning
				CO3	Under standing about various vertebral column-curves, postures, at lantooccipital region, cervical spine- cervic thoracic spine, thoracic spine, lumbar spine sacrum, coccyx

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17	2	**Clinical Radiography-Positioning Part I Laboratory**	**RDL108**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography
				CO2	Know About Upper limb radiography
				CO3	Understanding the Lower limb radiography
				CO4	Knowledge about Spinal radiography
				CO5	Know about various soft tissue larynx, Larynx, pharynx
18	2	**Modern Radiological & Imaginge quipment Including Physics Practical**	**RDL112**	**CO1**	The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications of mammography and computed radiography.
				CO2	Know about portable X-Ray Equipment
				CO3	Study about Mammography X-Ray tube
				CO4	Study about Dental X-Ray unit.
				CO5	Knowledge about Computed Tomography Parts
19	2	**Contrast and Special Radiography Procedures-Practical**	**RDL116**	**CO1**	The purpose of this course is to provide an understanding of physical concepts and underlying various technological applications of mammography and computed radiography.
				CO2	Know about Radiography in various positions for all the special radiological procedures, using contrast media.
				CO3	Identification of various films for all the special radiological procedures, using contrast media and related pathologies.
20	2	**Communication Skills-II Lab**	**ENG116**	**CO1**	Equip the learner with proficiency in reading comprehension.
				CO2	Enable the learner with improved writing skills and command over official/ corporate communication
				CO3	Enhance the learners' range of vocabulary and knowledge of the essentials of grammar.
				CO4	Have fairly good proficiency in reading comprehension
				CO5	Have enhanced writing skills and have command in official/ corporate communication
				CO6	Develop confidence in making presentation; oral or documentary
				CO1	This course is designed to provide the students the basic knowledge in Radiography with using newer modalities of radiology. At the end of the course, the student should be able to know about Computed
				CO2	Study about Scanning principle, Image acquisition, Image reconstruction, Image manipulation, Image display and documentation

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21	3	**Physics of Newer Imaging Modalities**	**RDL201**	**CO3**	Knowledge about CTArtifacts-Classification,Types,Causes.
				CO4	Knowledge about CT scan studies acquisition/protocols/techniques. Study about Dental X-Ray unit.
				CO5	Study & Knowledge about Patient preparation, Imaging techniques and protocols for-CTAngio ,Brain, C.T Enteroclysis/CTIVP/dualphase CT, CT Guided FNAC/biopsy
22	3	**Physics of Newer Imaging Modalities Laboratory**	**RDL203**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography with using newer modalities of radiology. At the end of the course, the student should be able to know about Computed
				CO2	Study about Scanning principle, Image acquisition, Image reconstruction, Image manipulation, Image display and documentation
				CO3	Knowledge about CTArtifacts-Classification,Types,Causes.
				CO4	Knowledge about CT scan studies acquisition/protocols/techniques. Study about Dental X-Ray unit.
				CO5	Study & Knowledge about Patient preparation, Imaging techniques and protocols for-CTAngio ,Brain, C.T Enteroclysis/CTIVP/dualphase CT, CT Guided FNAC/biopsy
23	3	**Clinical Radiography-**	**RDL205**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography.
24	3	**Clinical Radiography-**	**RDL207**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography.
25	3	**Newer Modalities Imaging**	**RDL209**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography with patient care and code of ethics
26	3	**Newer Modalities Imaging**	**RDL211**	**CO1**	This course is designed to provide the students the basic knowledge in Radiography with patient care and code of ethics
27	3	**Quality Control in Radiology and**	**RDL213**	**CO1**	This course is designed to provide the students the basic knowledge in Radiation protection,Biological effects of radiation,Planning of radiation installation-protection primary & secondary radiation and Personnel
28	3	**Basics of Computers Laboratory**	**CSE213**	**CO1**	Bridge the fundamental concepts of computers with the present level of knowledge of the students
				CO2	Familiarize operating systems, programming languages, peripheral devices, networking, multimedia and internet
				CO3	Understand binary, hexadecimal and octal number systems and their arithmetic
29	3	**Environmental Science**	**EVS001**	**CO1**	To connect and sensitize the students towards the environment and prevailing environmental issues (natural, physical, social and cultural)
				CO2	An Environmental Studies major will Prepare students to critically examine all sides of environmental issues and apply understanding from disciplines such as history, economics, psychology, law, literature, politics,
				CO3	Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales
				CO4	Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems
				CO1	To aware students regarding basic first aid techniques

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30	3	First Aid	MLS215	CO2	Learn about First-Aid for Respiratory & Cardiac Conditions
				CO3	Study about Wounds & Injuries & their Management & dressings
				CO4	Study about First Aid for Fractures, Dislocation & various neurological
31	4	Cross Sectional Anatomy and Physiology	RDL202	CO1	To study about the identify cross sectional anatomy in the sagittal, coronal and axial planes on CT and MRimages. Describe anatomical structural relationships. Recognize normal anatomy and build a personal
				CO2	Learn Anatomy of the upper thorax
				CO3	Learn CT/ MRI Images of theThorax-Normal and pathologic
				CO4	Study about Anatomy of the Pelvis-Bony structures and associated muscles
				CO5	Study about Brain-Cerebral hemispheres, Sinuses,Ventricles, Brainstem & Arterial/venous systems.
32	4	Cross Sectional Anatomy and Physiology Laboratory	RDL204	CO1	To study about the identify cross sectional anatomy in the sagittal, coronal and axial planes on CT and MR images. Describe anatomical structural relationships. Recognize normal anatomy and build a personal resource
				CO2	Demonstration of dissected parts
				CO3	Demonstration of skeleton-articulated and dis articulated.
				CO4	Know about Surface land mark-bony, muscular
33	4	Physics of Advanced Imaging Technology	RDL206	CO1	This course is designed to provide the student the basic knowledge in Magnetic resonance imaging investigations with using contrast media and imaging instrumentation,pulse sequences,bio-effects and safety in
				CO2	Study about various MRI instrumentation & Types of magnets.
				CO3	Knowledge about MR Angiography–TOF & PCA
				CO4	Learn about Advanced technique & instrumentation of MRI
				CO5	Methods of MRI imaging.
34	4	Physics of Advanced Imaging Technology Laboratory	RDL208	CO1	This course is designed to provide the student the basic knowledge in Magnetic resonance imaging investigations with using contrast media and imaging instrumentation,pulse sequences,bio-effects and safety in
				CO2	Study about various MRI instrumentation & Types of magnets.
				CO3	Knowledge about MR Angiography–TOF & PCA
				CO4	Learn about Advanced technique & instrumentation of MRI

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				CO5	Methods of MRI imaging.
35	4	**Radiographic Techniques of Advanced Imaging Technology**	**RDL210**	CO1	Study about Ultrasonography/ Doppler studies
				CO2	Understanding about Interaction of US with matter.
				CO3	Study about Real-time ultrasound.
				CO4	Knowledge about Techniques for imaging different anatomicareas,ultrasound artifacts,biological effects and safety.
				CO5	Learn about Patient preparation for Doppler, Doppler artifacts & vascular sonography
36	4	**Radiographic Techniques of Advanced Imaging Technology Laboratory**	**RDL212**	CO1	Study about Ultrasonography/ Doppler studies
				CO2	Understanding about Interaction of US with matter.
				CO3	Study about Real-time ultrasound.
				CO4	Knowledge about Techniques for imaging different anatomicareas,ultrasound artifacts,biological effects and safety.
				CO5	Learn about Patient preparation for Doppler, Doppler artifacts & vascular sonography
37	4	**Regulatory Requirements in Diagnostic Radiology & Imaging, Act and Rules, Regulations for JCI, NABH, NABHR**	**RDL214**	CO1	To study about the AERB safety and Ethics, Knowledge about Regulatory Bodies & regulatory Requirements
				CO2	Study about Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements
				CO3	Study about Role of Radiographer in Planning
				CO4	Study about Personnel and area monitoring
				CO5	Learn about Planning of X-ray rooms & darkrooms
38	4	**Regulatory Requirements in Diagnostic Radiology & Imaging, Act and Rules, Regulations for JCI, NABH, NABHR Laboratory**	**RDL216**	CO1	To study about the AERB safety and Ethics, Knowledge about Regulatory Bodies & regulatory Requirements
				CO2	Study about Responsibilities of licenses, registrants & employers and Enforcement of Regulatory requirements
				CO3	Study about Role of Radiographer in Planning
				CO4	Study about Personnel and area monitoring
				CO5	Learn about Planning of X-ray rooms & darkrooms

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39	4	Introduction to National Healthcare Delivery System in	RDL218	CO1	The course provides the students a basic insight into the main features of the Indian health care delivery system and how it compares with the other systems of the world
				CO2	The students know about national policies
40	4	Medical Microbiology and Medical Terminology	RDL220	CO1	This subject introduces the elements of medical terminology
				CO2	The students know about the terminology used by various domain doctors and practioners for the diagnosis, treatment of disease
41	5	Quality Assurance & Radiation Safety (AERB Guidelines) in Diagnostic Radiology	RDL301	CO1	The objective is to induce idea on quality assurance indifferent radiological modalities
				CO2	Understand the Quality Assurance and quality control of Computed Tomography
				CO3	Studying about Quality Assurance and quality control of Magnetic Resonance Imaging.
				CO4	Know About Quality Assurance and quality control of Ultrasonography.
				CO5	Study about the Image artifacts their different types, causes and remedies
40	5	Quality Assurance & Radiation Safety	RDL303	CO1	The objective is to induce idea on quality assurance in different radiological modalities
41	5	Hospital Practice & Care of Patients	RDL305	CO1	The objective is to learn to hospital staffing, Medical records and documentation and Understood the Legal issues, Professional ethics
				CO2	Understanding Methods of effective communication
				CO3	Know about various Elementary personal and departmental hygiene.
				CO4	Study about various types of Moving chair and stretcher
				CO5	Study about Administration of drugs and contrast media
42	5	Hospital Practice & Care of Patients	RDL307	CO1	The objective is to learn to hospital staffing, Medical records and documentation and Understood the Legal issues, Professional ethics.
43	5	Nuclear Medicine	RDL309	CO1	The objective is to learn basics about the radioactivity and radioactive nuclides
				CO2	To Study about Production of Radionuclides Reactor produced radionuclide
				CO3	To Study about Radiopharmacy & Handling & Transport of Radio-nuclides.
				CO4	To study about Safehandling of radioactive materials.
				CO5	Study about Equipment'sof NMT

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44	5	**Nuclear Medicine Laboratory**	**RDL311**	CO1	The objective is to learn basics about the radioactivity and radioactive nuclides.
45	5	**Generic Skills And Entrepreneurship Development**	**COM317**	CO1	This paper is aimed at developing employability skills and conceptual understanding among students for setting up one's own business venture/enterprise
				CO2	Student will be able to explain the importance of generic skills
				CO3	They can Manage himself/herself physically, intellectually and psychologically
				CO4	They can Demonstrate self-development

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Dr. Vikas Sharma
(DEAN)

M.Sc. Zool

PEO,PO,PSO-ZOOLOGY

SANT BABA BHAG SINGH UNIVERSITY, KHIALA -1430030, JALANDHAR	
Institute Name:	**UIS**
Department Name:	**Life Sciences & Allied Health Sciences**
Programme Name:	**M.Sc. (Hons.)Zoologyy**
Number of Semetsers	**IV**
Vision:	To bridge the gap between demand and supply for Life Science and Allied Health Professionals with grooming young generations along with their moral and spiritual development.
Mission:	To radiate the knowledge of Life Science and Allied Health Science through quality education by using latest technology, modern infrastructure and the framework needed for the development of professionals.

Details of Programme Educational Objectives,Program Outcomes,Program Specific Outcomes

S.No.		Programme Educational Objective (PEO) (The Graduate/Undergraduate will….)
1	PEO1	To equip students with recent advances in Zoology from organismic to reductionist biology.
2	PEO2	To empower students to understand the challenges of society and the country that falls into the realms of Zoology, such as Aquaculture, Physiology, Entomology, Cell Biology, Reproductive Health, Behavior and Micro-biome and their roles in health and diseases, etc.
3	PEO3	Offers students a series of elective courses so that they can choose to specialize in the specific area of their interests in Zoology.
4	PEO4	To provide skill-based training into socially relevant areas of Zoology.
		Programme Outcomes (PO)(At the end of Programme/Degree mentioned above , the graduates will be able to ……)
1	PO1	**Disciplinary Knowledge:** Acquire knowledge and understanding of facts, concepts, principles and theories relating to subject areas.

Dr. Shweta (OIC)

Dr. Vikas Sharma (I/C Dean)

PEO,PO,PSO-ZOOLOGY

2	PO2	**Critical Thinking:** Analyze complex interactions among the various animals of different phyla, their distribution and their relationship with the environment
3	PO3	**Communicative Abilities:** Ability to communicate effectively in both oral and written contexts in the form of technical papers, project reports, design documents and seminar presentations.
4	PO4	**Scientific/Analytical Reasoning:** Carry out internship programme and research projects to develop scientific skills and innovative ideas.
5	PO5	**Acquiring Skills:** Gain knowledge of agro based small scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.
6	PO6	**Modern Tool Usage:** Acquire the skill to design, develop and modify systems to meet desired needs within realistic constraints.
7	PO7	**Ability for Competitive Exams:** Face and succeed in high level competitive examinations like NET, and SET.
8	PO8	**Environment & Sustainability:** Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. And could utilize the obtained scientific knowledge to create eco-friendly environment.
9	PO9	**Ethics:** Develops empathy and love towards the animals. The student is aware of what constitutes unethical behavior-- plagiarism, fabrication and misrepresentation or manipulation of data. Prepare expressive, ethical and responsible citizens with proven expertise.
10	PO10	**Employment:** Students will be able to get employed in public and private sector. Moreover, they will be able to set up their own business.
	Programme Specific Outcomes (PSO)	
1	PSO1	Acquire knowledge on the various aspects of life sciences including Biochemistry, Cell and Molecular Biology, Genetics, Physiology, Developmental Biology, Endocrinology, Mammalian Reproductive Physiology, Biotechnology, Bioinformatics, Ichthyology and Entomology.
2	PSO2	Explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system and develop theoretical and practical knowledge in handling the animals and using them as model organism
3	PSO3	Acquire skills in Zoology in a global, economic, environmental, and societal context.
4	PSO4	Pursue M. Phil/ Ph. D, compete in National Eligibility Test (NET) and select an independent professional career.
5	PSO5	Apply ethical principles and commit to professional ethics and responsibilities and norms of the work/research practice.

Dr. Shende (CoD)

Dr. Vikas Thorat (Dean)

Programme Name:			M.Sc. (Hons.) Zoology

Details of Course Outcomes (At the end of course, the post-graduates will be able to .....)

S. No	Semester	Course Name	Course Code		Course Outcomes
1	1	Biosystematics, Taxonomy & Evolution	ZOO501	CO1	Learn the basic concepts of biosystematics and taxonomy
				CO2	Study the taxonomic collections, preservation, curetting, process of identification in biology
				CO3	Understand the molecular basis of evolution
2	1	Population Ecology & Environmental Physiology	ZOO503	CO1	Understand the basic principles of ecology and ecosystem.
				CO2	Describe the characteristics of the major biomes and biogeographical regions of the Earth.
				CO3	Evaluate environmental issues and management practices.
3	1	Cell and Molecular Biology	ZOO505	CO1	Understand the various cell types and cell divisions.
				CO2	Learn the structure and function of the cells along with cell signalling.
				CO3	Study the biology of cancer and aging
4	1	Tools & Techniques for Biology	ZOO507	CO1	Learn the principle, and application of microscopic techniques.
				CO2	Learn the principle, and application of photometry.
				CO3	Understand the working principle of separation techniques in biology like chromatography, electrophoresis, etc.
5	1	Intellectual Property Right	ZOO509	CO1	Understand the concept, scope and importance of IPR.
				CO2	Know about patents, copyrights, trademarks and industrial designs.
				CO3	Get awareness of acquiring the patent and copyright for the innovative works.
6	1	Biostatistical Methods	MAT515	CO1	Able to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases
				CO2	Learn to apply discrete and continuous probability distributions to various business problems.
				CO3	Implement knowledge to compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting and also perform ANOVA and F-test.
7	1	Ecology, Environmental Physiology, Systematics, Taxonomy and Evolution Practical	ZOO511	CO1	Understand the Animal association and communities.
				CO2	Acquire knowledge of various eco-physiological adaptations in animals.
				CO3	Learn the process of evolution and population genetics.

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Dr. Vikas Kumar Dewa

Sant Baba Bhag Singh University, Village Khiala, P.O. Padhiana, Distt. Jalandhar

8	1	Molecular Cell Biology and Tools & Techniques Practical	ZOO513	CO1	Understand cytology by observing various slides
				CO2	Differentiate between stages of mitosis and meiosis
				CO3	Study the process of Mendelian ratios (monohybrid and dihybrid ratio)
9	2	**Seminars-I**	**ZOO514**	CO1	Ability to communicate effectively in both oral and written contexts
				CO2	Acquire knowledge and understanding of facts and concepts relating to subject area
				CO3	Acquire confidence and leadership qualities
10	2	**General & Comparative Animal Physiology**	**ZOO502**	CO1	Understand the formation and composition of blood
				CO2	Learn thecomparative physiology in animal groups
				CO3	Analyze the mechanism of hormone action between animal groups
11	2	**Basic Endocrinology**	**ZOO504**	CO1	Study the classification, modes and phylogeny of endocrine system
				CO2	Study the endocrine control of various physiological mechanisms in nemerteans, annelids, mollusks, arthropods (Insects and crustaceans) and echinodermates
				CO3	Study the comparative morphology, anatomy, functions of various endocrine glands present in a human body. Also study the deficiency diseases caused, and chemical structure of hormones secreted from the glands
12	2	**Biomolecules & Structural Biology**	**ZOO506**	CO1	Explain mechanisms of important biological processes: cell signalling, transcription, translation, and protein secretion
				CO2	Analyse biosynthesis and structure of macromolecules
				CO3	Illustrate the mechanism of enzyme action.
13	2	**Ichthyology**	**ZOO508**	CO1	Study the morphology and classification in fishes
				CO2	Study of sense organs and some special features in fishes.
				CO3	Provide the students with sufficient information regarding adaptation to various ecological conditions alongwith feeding, nutrition and reproduction so that they may appreciate better the biology of this fascinating and useful group of aquatic animals.
14	2	**Natural Hazards and Disaster Management**	**EVS003**	CO1	Learn the conceptof natural hazards and their impact
				CO2	Study vulnerability, risk assessment and reduction strategies
				CO3	Understand the role of disaster management system

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15	2	Introductory Concepts of Computer Technology	CSE554	CO1	Understand basics of computer and its operating system
				CO2	Distinguish the types of software
				CO3	Learn the MS-Windows basics and applications
16	2	Physiology and Biochemistry Practical	ZOO510	CO1	Learn to analyse, the basic concepts of chemical reactions that occur in living systems
				CO2	Understand the Quantitative determination of biological parameters.
				CO3	Study and perform experiments of blood groups and Rh factor, blood clotting time
17	2	Endocrinology and Ichthyology Practical	ZOO512	CO1	Study the preparation of permanent slides some endocrine glands and the abnormalities related to hormones.
				CO2	Study the process of spermatogenesis, process of oogenesis
				CO3	Learn the classification and external morphology of fishes.
18	2	Introductory Concepts of Computer Technology Practical	CSE556	CO1	Learn the basics of computer and its operating system
				CO2	Understand the working of different softwares
				CO3	Learn the basics of MS-Word, MS-Excel, MS-PowerPoint
19	3	Project work-I	ZOO629	CO1	Study the literature regarding the projects given
				CO2	Know the materials required and how to perform the projects in field or laboratory
				CO3	Perform the field or laboratory work regarding the projects
20	3	Genetics and Cytogenetics	ZOO601	CO1	Describe the mechanism of genetic variation.
				CO2	Understand the genetic defects and role of inbreeding and outbreeding.
				CO3	Understand mechanism and regulation of gene expression.
21	3	Developmental Biology and Embryology	ZOO603	CO1	Learn the processes of cell cycle and cell signaling
				CO2	Understand mechanism of gametogenesis, fertilization and early development
				CO3	Understand concept of Aging, Apoptosis and Senescence
22	3	General Entomology &Insect Morphology	ZOO605	CO1	Know the techniques of insect collection, preservation and identification
				CO2	Learn the basic structure and function of insect body parts.
				CO3	Understand the process of coloration and mimicry, light production, sound production and reception in insects
23	3	Reproductive Physiology In Males	ZOO607	CO1	Understand the History and scope of endocrinology, reproductive physiology in males
				CO2	Learn the structure and function of the primary and secondary sex organs in males
				CO3	Study the different types of reproductive disorders

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24	3	Fish Structure & Function	ZOO609	CO1	Learn the structure and function of fish body parts
				CO2	Study the feeding habits of fish
				CO3	Analyze the mechanism of hybridization and sex determination
25	3	Insect Anatomy &Physiology	ZOO611	CO1	Learn the physiology and significance of biological processes
				CO2	Learn the structure and function of mechanoreceptors, chemoreceptors and photoreceptors in insects
				CO3	Study the chemistry and functions of hormones in insects.
26	3	**Reproductive Physiology In Females**	ZOO613	CO1	Understand the History and scope of endocrinology, reproductive physiology in females
				CO2	Learn the structure and function of the primary and secondary sex organs in females
				CO3	Study the different types of reproductive disorders
27	3	**Fish Morphology &Anatomy**	ZOO615	CO1	Distinguish the fishes based on their morphology
				CO2	Learn the anatomical functions of fishes
				CO3	Study the physiological metabolic functions in fishes
28	3	**Advancement in Apiculture & Sericulture**	ZOO617	CO1	Understand the biology of bees and silkworms
				CO2	Learn the rearing of silkworms for obtaining silk
				CO3	Know the pests and diseases associated with honeybees and silkworms
29	3	**Aquaculture**	ZOO619	CO1	Analyze the history, purpose and Scope Aquaculture
				CO2	Study the physicochemical factors of aquatic ecosystem
				CO3	Acquire knowledge of Genetics approach to aquaculture
30	3	**Genetics, Cytogenetics, Development and Differentiation Practical**	ZOO621	CO1	Study the mechanism of spermatogenesis and oogenesis
				CO2	Identify the different stages of mitosis and meiosis.
				CO3	Learn to prepare human karyotype
31	3	**General Entomology Practical**	ZOO623	CO1	Observe and learn the mechanism of nervous, digestive and reproductive systems in insects
				CO2	Study the life histories of insects like honey bee, lac insect, silkworm and housefly.
				CO3	Observe and learn the process of microtomy of insect material
32	3	**Reproductive Physiology Practical**	ZOO625	CO1	Study the endocrine glands in vertebrate and invertebrates
				CO2	Identify the chemical structures of peptides and steroid hormones
				CO3	Learn the process of microtomy of endocrine material
33	3	**Fish Biology Practical**	ZOO627	CO1	Learn the anatomy of various organ systems
				CO2	Study the cranial nerves of teleost fishes
				CO3	Study the osteology of fish

SHABIH

Dr. Shweta (COD)

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Distt. Jalandhar

34	4	Project Work-II	ZOO626	CO1	Compile the results regarding the projects done
				CO2	Interpret the results and discuss the observations and important points regarding the results
				CO3	Write the dissertations regarding the projects submit them to the department
35	4	Animal Behavior	ZOO602	CO1	Understand Animal behavior and response of animals to different instincts
				CO2	Learn the Interaction and adaptations in Animal
				CO3	Understand the Social behavior of animals.
36	4	Introduction to Immunology	ZOO604	CO1	Have knowledge of tissues, cells and molecules involved in host defense mechanisms
				CO2	Study the Interactions of antigens, antibodies, complements and other immune components
				CO3	Understand the concepts of tumor immunology
37	4	Insect Taxonomy	ZOO606	CO1	Learn the salient features and classification of insects
				CO2	Learn the taxonomic collections, preservation and process of identification
				CO3	Learn the distinguishing characters of different insect orders and families
38	4	Cellular Physiology	ZOO608	CO1	Learn the structure and function of cell membrane
				CO2	Study the physiology of different types of muscles
				CO3	Acquire knowledge of significance of thermodynamics in cell
39	4	Taxonomy, Systematics & Ecology of Fishes	ZOO610	CO1	Learn the classification of fishes
				CO2	Study the working techniques of fishing and aquarium
				CO3	Analyze the primary productivity of fish ponds and itssignificance
40	4	Applied Entomology	ZOO612	CO1	Know the social organization and techniques of Apiculture, Lac Culture and Sericulture
				CO2	Study the nature of damage and control methods of pests of crops.
				CO3	Learn proper use of insecticides for the control of insect pests.
41	4	Mammalian Physiology	ZOO614	CO1	Study the physiology of the sensory organs of mammals
				CO2	Understand the physiology of respiration, excretion, digestion
				CO3	Study the regulation and problems associated with the physiology in body
42	4	Pisciculture & Economic Importance of Fishes	ZOO616	CO1	Collect fish from natural resources
				CO2	Learn the Management of hatcheries, nurseries and rearingponds
				CO3	Learn the Economic importance and by-products of fishes.

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43	4	Animal Behavior and Vertebrate Immunology Practical	ZOO618	CO1	Understand the Exploratory Behaviour in rats/mice
				CO2	Learn to prepare Blood film and identification of cells
				CO3	Study of antigen-antibody interaction
44	4	Insect Taxonomy, Ecology & Development Applied Entomology Practical	ZOO620	CO1	Learn the identification and classification of various insects by using taxonomic keys
				CO2	To do the field studies of insects to understand their habits, benificial and harmful activities
				CO3	Study the process of biological pest control and insect control appliances
45	4	Cellular and Mammalian Physiology Practical	ZOO622	CO1	Understand the estimation of RBC's, WBC's and platelets count in blood sample
				CO2	Study the mechanism and significance of chromatography.
				CO3	Study the mechanism of spectrophotometer.
46	4	Fish Morphology & Fisheries Practical	ZOO624	CO1	Learn to identify freshwater fishes
				CO2	Analyze the nutrient content of water
				CO3	Learn to technique of microtomy of fish materials

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SANT BABA BHAG SINGH UNIVERSITY, KHIALA -1430030, JALANDHAR	
Institute Name:	**UIS**
Department Name:	**Life Sciences & Allied Health Sciences**
Programme Name:	**M.Sc. Medical Microbiology/PG032**
Number of Semetsers	**IV**
Vision:	To bridge the gap between demand and supply for Life Science and Allied Health Professionals with grooming young generations along with their moral and spiritual development.
Mission:	To radiate the knowledge of Life Science and Allied Health Science through quality education by using latest technology, modern infrastructure and the framework needed for the development of professionals.

Details of Programme Educational Objectives,Program Outcomes,Program Specific Outcomes

S.No.		Programme Educational Objective (PEO) (The Graduate/Undergraduate will....)
1	PEO1	To educate graduates in basic and advanced areas of Medical microbiology and other related subjects along with sensitizing them to the scope for research.
2	PEO2	To empower the students with analytical and research skills.
3	PEO3	To foster entrepreneurial endeavors and to prepare a competent generation of microbiologist.
4	PEO4	To develop microbiologists with skills to pursue careers both in academia as well as industry.
		Programme Outcomes (PO)(At the end of Programme/Degree mentioned above , the graduates will be able to .....)
1	PO1	**Disciplinary Knowledge**: The student has acquired in-depth knowledge of the various theoretical and practical concepts regarding the role of microbial infection in human health and its immune response.
2	PO2	**Critical Thinking:** Critical thinking as an attribute enables a student to identify, formulate and apply knowledge to develop critical thinking and practical understanding in the field of microbiology to find solutions for human benefits.

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3	PO3	**Problem Solving:** gain hands on experience in state-of-the-art laboratory equipment that could enrich them to perform high through put research on microorganisms and execute diagnostic procedures in field of medical microbiology
4	PO4	**Scientific /Analytical Reasoning:** Students learn to investigate, experiments/ theoretical methods, relate information and interpretation of data based on scientific reasoning. The student will be able to draw logical conclusions based on a group of observations, mathematical techniques and measurements
5	PO5	**Multicultural Competence:** The ability to understand and constectively relate to uniqueness of each student in light of diverse cultre that influance in multy prospectives
6	PO6	**Environment & Sustainability:** Student's ability to understand over all goal of conserving natural resourses and create and dovelop energy efficient projects and practice.
7	PO7	**Research related skills & Ethics:** develop the skill to think independently, plan research and execute it in different fields of Microbiology. The student is aware of what constitutes unethical behavior-- fabrication, plagiarism and misrepresentation or manipulation of data
8	PO8	**Individual and Team Work:** acquire the ability to function effectively on teams to accomplish a common goal. The student is capable of contributing meaningfully to team ethos and goals.
9	PO9	**Communication Skills:** Students are incouraged to communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing
10	PO10	**Life long Learning:** students opt for higher studies, jobs in various sectors and entrepreneurship abilities in the field of microbiology
	Programme Specific Outcomes (PSO)	
1	PSO1	Get equipped with a theoretical and practical knowledge of Medical microbiology.
2	PSO2	Explain about various applications of Microbiology such as Microbial Pathogenicity.
3	PSO3	Design and execute experiments related to Basic Microbiology, Immunology, Molecular Biology, Recombinant DNA Technology, and Microbial Genetics.
4	PSO4	Execute a short research project incorporating techniques of Basic and Advanced Microbiology under supervision.
5	PSO5	Take up a suitable position in academia or industry, and to pursue a career in research if so desired

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Programme Name:	M.Sc Medical Microbiology/PG032				
Details of Course Outcomes ((At the end of course, the graduates will be able to ……)					
S. No	Semester	Course Name	Course Code		Course Outcomes
1	1st	Basic of Medical Microbiology	MMB501	CO1	Get about the historical events and developments in Microbiology. Theoretical & practical knowledge of Microbial world, Microscopy; their handling techniques and staining procedures
				CO2	Familiarization with sterilization Techniques, Use of standard safety measures while handling infective materials.
				CO3	Knowledge of Microbial cultivation various Chemotherapeutic agents & Nosocomial infection
2	1st	Basic of Medical Microbiology (Practical)	MMB503	CO1	Demonstrate different staining (Simple, differential & special) techniques.
				CO2	Preparation of different type of media & Biochemical tests of bacteria
				CO3	Know the effect of of nutritional & environmental factors on microbial growth.
3	1st	Systematic Bacteriology	MMB505	CO1	Understand the characteristics of bacterial cells, cell organelles, cell wall composition and various appendages like capsules, flagella or pili
				CO2	Differentiate a large number of common bacteria by their characteristics features & classify bacteria into groups.
				CO3	Apply the knowledge to identify diseases, its diagnosis and predict the treatment plan
4	1st	Systematic Bacteriology Practical	MMB507	CO1	Understand the basic laboratory practices in the field of bacteriology
				CO2	Apply this knowledge to isolate the pathogens from different types of samples such as blood, urine, Sputum and Pus
				CO3	Perform antibiotic sensitivity test and other serological test for the detection of pathogens.
5	1st	Molecular Biology and Bioinformatics	MMB509	CO1	At the conclusion of the course, students will acquire comprehensive knowledge about molecular events involved in the DNA replication, transcription and translation
				CO2	Acquire basic knowledge regarding bioinformatics and its role in molecular data analysis
				CO3	Acquire knowledge about sequence alignment and analysis
				CO4	Able to understand the principles and application of various molecular and data generation tools
6	1st	Bioinstrumentation	MMB511	CO1	Learn the principle, and application of microscopic techniques.
				CO2	Learn the principle, and application of photometry.
				CO3	Understand the working principle of separation techniques in biology like chromatography, electrophoresis, etc.
7	1st	Intellectual Property Right	MMB513	CO1	Understand the concept, scope and importance of IPR.
				CO2	Know about patents, copyrights, trademarks and industrial designs.
				CO3	Get awareness of acquiring the patent and copyright for the innovative works.
				CO1	Able to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases

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8	1st	Biostatistical Methods	MAT515	CO2	Learn to apply discrete and continuous probability distributions to various business problems.
				CO3	Implement knowledge to compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting and also perform ANOVA and F-test.
9	2nd	Applied Bacteriology	MMB502	CO1	Explain about applications of Microbiology such as Microbial Pathogenicity & Laboratory diagnosis of various infective syndromes
				CO2	Demonstrate Antibiotic susceptibility testing in bacteriology.
				CO3	Know the collection, transportation and processing of Bacteriological examination of water, milk, food, air samples & methods to
10	2nd	Applied Bacteriology (Practical)	MMB504	CO1	Understand the basic laboratory practices in the field of bacteriology
				CO2	To perform antibiotic susceptibility testing of clinical isolates by using standard method.
				CO3	Collection, transportation and processing of various clinical samples & preservation of isolates.
11	2nd	Medical Parasitology	MMB506	CO1	Identify parasitism, parasites and their examples
				CO2	Comprehend the techniques for diagnosis of parasites
				CO3	Know the role of vector in spreading the parasitic diseases.
12	2nd	Medical Parasitology (Practical)	MMB508	CO1	Perform the examination of stool, blood and sptum samples for diagnosis of disease.
				CO2	Demonstrate various staining techniques.
				CO3	Comprehend the techniques for diagnosis of parasites.
13	2nd	Biochemistry and Metabolism	MMB510	CO1	The students will be able to describe the basic structure and chemical properties of biomolecules involved in microbial science: carbohydrates, proteins, amino acids, nucleic acids
				CO2	Able to illustrate the metabolism of carbohydrates, lipids and amino acids
				CO3	Able to describe nomenclature, classification of enzymes and identify the enzyme action and kinetics
				CO4	Able to apply the knowledge acquired above to the microbial systems
14	2nd	Biochemistry and Metabolism Practical	MMB512	CO1	The students will be able to identify and perform various biochemical tests
				CO2	Able to apply various tests in diagnosis and characterisation of microbes
15	2nd	Antimicrobial agents and Chemotherapy	MMB514	CO1	The students will be able to acquire conceptual knowledge of antimicrobial agents
				CO2	Able to provide an overview of the mode of action of antibiotics
				CO3	Able to understand the mechanism involved of the chemotherapeutic agents in subsiding the microbial activities
16	2nd	Introductory Concepts of Computer Technology	CSE554	CO1	The students will Understand Basics of computer and its operating system
				CO2	Distinguish the types of Software
				CO3	Learn the MS-Windows basics and applications
17	2nd	Introductory Concepts of Computer	CSE556	CO1	Learn the basics of computer and its operating system
				CO2	Understand the working of different softwares

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		Technology		CO3	Learn the basics of MS-Word, MS-Excel, MS-PowerPoint
18	2nd	Natural Hazards and Disaster Management	EVS003	CO1	The students will Learn the conceptof natural hazards
				CO2	Understand the role of Disaster management system
19	3rd	Medical Mycology	MMB601	CO1	Explain classification, morphology and laboratory diagnosis and prevention measures of fungi
				CO2	Differentiate between superficial, subcutaneous, systemic and opportunistic mycosis.
				CO3	Identification and description of mycosis
20	3rd	Medical Mycology (Practical)	MMB603	CO1	Collect clinical specimen of fungal infection
				CO2	Perform laboratory investigations for the diagnosis of infectious diseases caused by fungi
				CO3	Maintain stock cultures
21	3rd	Medical Virology	MMB605	CO1	Explain classification, nomenclature,structure and properties of viruses
				CO2	Apply this knowledge to understand the cultivation,isolation,transmission,mode of infection of various viruses
				CO3	Analyze the role of molecular techniques to identify diseases and laboratory diagnosis and prophylaxis
22	3rd	Medical Virology (Practical)	MMB607	CO1	Perform blood samples for the diagnosis of viruses through serological tests.
				CO2	Preparation of different type of media for the cultivation of viruses
				CO3	Demonstrate handling of animals for pathogenicity tests.
23	3rd	Immunology	MMB609	CO1	To provide students a conceptual knowledge of immunological processes.
				CO2	Understand the Structure and function of immune system, Antibodies and other immune cells.
				CO3	Provide an overview of the interaction between the immune system and pathogens
24	3rd	munology (Practi	MMB611	CO1	Able to understand the basic laboratory practices in the field of immunology
				CO2	Determination of TLC, DLC,ABO & Rh factor from blood sample
				CO3	Demonstration of antigen / antibody determination by various techniques
25	3rd	Recombinant DNA technology	MMB613	CO1	The students will be able to understand the basics of recombinant DNA technology
				CO2	Able to identify the different DNA modifying enzymes and understand their roles in microbial technology
				CO3	Able to acquire knowledge of different cloning vectors; cloning techniques and utilize them to produce pharmeutical products for treatment of microbial infections.

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26	3rd	Research Methology	MMB615	CO1	The students will be able to learn how to collect, read and manage research information
				CO2	Able to plan experiments, conduct and observe results
				CO3	Able to write and publish results effectively
27	3rd	Seminar	MMB617	CO1	Understand the application of computer.
				CO2	Develop Critical Thinking, Interdisciplinary Inquiry
				CO3	Develop Presentation Skills. communication skill
28	4th	Dissertation/ Project	MMB602	CO1	Understand the research methodology and techniques of experimental work.
				CO2	Develope skill of Scientific writting.
				CO3	Impart proficiency of designing scientific experiments and carry out those experiments

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