Shri Rawatpura Sarkar University, Raipur

Faculty of Science

BACHELOR OF VOCATIONAL TRAINING IN MEDICAL LABORATORY TECHNOLOGY

B.Voc. MLT

Semester – II

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S.No.	Course Code	Course Title	**Type of Course**	Hours / Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs)
				L	**T**	**P**		Continuous Evaluation	Sem End Exam	Total	
1	SBV03201T	Basic Biochemistry	Core	4	-	-	4	30	70	100	3
2	SBV03202T	General Microbiology	Core	4	-	-	4	30	70	100	3
3	SBV03203T	Fundamentals of MLT	Core	4	-	-	4	30	70	100	3
4	SBV03211T	Environmental Studies	AECC	4	-	-	4	30	70	100	3
5	SBV03291P	Lab Course: I: Basic Biochemistry	Core Practical	-	-	4	2	15	35	50	4
6	SBV03292P	Lab Course II : General Microbiology	Core Practical	-	-	4	2	15	35	50	4
7	SBV03293P	Lab Course III: Fundamentals of MLT	Core Practical	-	-	4	2	15	35	50	4
		Total					**22**			**550**	

<table>
<tr><td>Course Title</td><td colspan="5">BASIC BIOCHEMISTRY/ INTRODUCTION TO BIOCHEMISTRY</td></tr>
<tr><td>Course Code</td><td colspan="5">SBV03201T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Introductory Biochemistry/ Basic Biology</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• This module is generel introduction to the basic concept of biochemistry and the function of carbohydrate, protein, lipid. The module also gives insight to importance of biomolecules.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT 1
Carbohydrates- Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)

UNIT 2
Proteins -Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, haemoglobin, collagen)

UNIT 3
Lipids- Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane

UNIT 4
Nucleic Acid – DNA, RNA : General Properties, Structure and Function.

UNIT 5
Vitamins – Water soluble and Fat soluble vitamins
Minerals--Na, K, Ca, P, Fe, Cu and Se (requirements, availability and properties)</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1:Classify carbohydrates, lipids and amino acids and correlate their functions.
2: Analyze the importance, functions and roles of proteins in biological systems.
3:Perceive the structures and importance of Adenosine triphosphate
4: Understand the prosthetic group-Thiamine Pyrophosphate, coenzyme,metal cofactors in the enzyme
5:Acquire the knowledge about the principles of catalytic reactions and inhibition.</td></tr>
<tr><td>Textbooks And Reference Books</td><td colspan="5">1.Campbell, MK Biochemistry, 7th ed., Published by Cengage Learning, (2012)
2.Campbell, PN and Smith AD ,Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone,(2011)
3.Tymoczko JL, Berg JM and Stryer L ,Biochemistry: A short course, 2nd ed., W.H.Freeman,(2012)
4.Berg JM, Tymoczko JL and Stryer L ,Biochemistry, W.H.Freeman and Company,(2011)</td></tr>
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<tr><td>Course Title</td><td colspan="5">GENERAL MICROBIOLOGY</td></tr>
<tr><td>Course Code</td><td colspan="5">SBV03202T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>C</td><td></td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">Introductory General Microbiology</td></tr>
<tr><td>Course Objectives</td><td colspan="5">• The module gives an introduction to microbiology. It gives insight into general microbiology, morphology & physiology of Bacteria along with bacterial genetics.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT I
History of Development of Microbiology. Development of microbiology as a discipline, Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming,Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology, Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A.Waksman. Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner.
UNIT II
General characteristics of Bacteria, Archaea, Mycoplasmas and Cyanobacteria. Ultra structure of Prokaryotic cell- Variant components and invariant components. General characteristics of Viruses. Morphology, Structure and replication of TMV and HIV. Replications of Bacteria phage (T4)
UNIT III
General characteristics and outline classification of Fungi, Algae and Protozoa. (up to classes only). Principles of microscopy - Bright field phase contrast and Electron microscopy .
UNIT IV
Staining Techniques –Simple and Differential (Gram Staining and Spore Staining). Sterilization and disinfection techniques - Physical methods – autoclave, hot- air oven, Radiation methods – UV rays, Gamma rays. Chemical methods – alcohols, phenols – Filtration methods HEPA Filters – Laminar Airflow Micropore filtration.
UNIT V
Isolation of Microorganisms from natural habitats. Pure culture techiques – dilution-plating, Streak-plate, Spread-plate, Pour-Plate and Enrichment culturing. Preservation of microbial cultures – subculturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.</td></tr>
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Course Outcomes	**1**. Understand the basic microbial structure, function & study the comparative characteristics of Prokaryotes & Eukaryotes **2:** Understand and compare gram +ve & gram –ve cell walls. **3.** Understand the microbial transport systems, nutritional requirements of bacteria. **4.** Understand the effect of environmental factors on the growth of bacteria **5**. Understand physical & chemical means of sterilization.
Textbooks And Reference Books	1. Textbook of Microbiology, C K J Paniker, Ninth Edition, Orient Blackswan (2011) 2. Textbook of Microbiology and Immunology, Subhash Chandra Patija, Second edition (2012) 3. Medical Microbiology, Jawetz, Melnick and Adelberg's, 27th Edition, McGraw Hill.(2017) 4. Introductory Phycology By Kumar HD,Second Edition, East Western Press,(2007)

Course Title	**FUNDAMENTALS OF MLT**				
Course Code	SBV03203T				
Course Credits	**L**	**T**	**P**	**C**	
	4	**-**	**-**	**4**	
Prerequisites	**Introductory to Basics of MLT**				
Course Objectives	This module disinged to learn about basic concept of clinical laboratory, it comprises knowledge of medical care, biosefty, concept of basic lab instruments, that supports the student to develop practical skill.				
Course Contents	**UNIT – 1** **1.1** Human Health : Health Concepts, Medical care in developing countries and safety regulations**.** **1.2** Medical care : In India & Medical laboratories of developing countries **UNIT – 2** Clinical Laboratory : Organization of the clinical laboratory and role of medical laboratory technicians Functional components of clinical laboratories, cleanliness precautions to be taken with reference to the patients. **UNIT – 3** 3.1 Communication : Communication between physician and patients, and the medical laboratory Professional. 3.2 General comments on Specimen : Blood, Urine, Stool & Semen. **UNIT – 4** 4.1 Laboratory Management : Laboratory management, planning and Medical records. 4.2 Bio medical Waste Management : Safety measures and first aid. **UNIT – 5** Laboratory equipment : Common laboratory equipments and their operation.Cleaning and care of general laboratory glassware and equipment. Principles, functions and uses of balances, centrifuge machines, colorimeters and other equipments.				

Course Outcomes	**1:** Remember the health concepts, medical care and safety regulation for the good clinical laboratory. **2:** Perceive the communication between physician and patients which is important for the medical laboratory profession. **3:** Understand about the management of the medical laboratory, planning and medical records. **4:** Understand the management of bio medical waste, safety and first aid. **5:** Understand the laboratory equipments, their uses, cleaning and care.
Textbooks And Reference Books	1. Medical Laboratory Technology by Kanai L Mukherjee, Second Edition, McGraw Hill. (2015) 2. Textbook of Medical Laboratory Technology by Praful B. Godkar,Darshan P. Godka, Second edition .(2015).

Course Title	**ENVIRONMENTAL STUDIES**				
Course Code	SBV03211T				
Course Credits	**L**	**T**	**P**	**C**	
	4	**-**	**-**	**4**	
Prerequisites	**Introductory Environment**				
Course Objectives	This course is intended to creat awareness among the youth regarding our environment and its management				
Course Contents	**UNIT – 1** Natural Resources: Renewable and Nonrenewable Resources Forest, Water and Mineral resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people and relevant forest Act. Use and over-utilization of surface and ground water, floods drought, conflicts over water, dams benefits and problems and relevant Act. Use and exploitation, environmental effects of extracting and using mineral resources. Food resources and energy resources food, Energy and Land resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging , salinity. Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land as a resource, land degradation, man induced landslides soil erosion and desertification. **UNIT – 2** Biodiversity and its Conservation Introduction - Definition: genetic. species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use. productive use, social ethics, aesthetic and option values, Biodiversity at global, National and local levels, India as mega-diversity nation, Hotspots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife, conflict,endangered and endemic species of India, Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.				

	UNIT – 3 Causes, effect and control measures of Air water, soil, marine, noise, nuclear pollution and Human population, Solid waste management: Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Disaster Management: floods, earthquake, cyclone and landslides. **UNIT – 4** Social issues an environment: From Unsustainable to Sustainable development • Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Environmental ethics : Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. • Wasteland reclamation. • Consumerism and waste products. **UNIT – 5** Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act • Issues involved in enforcement of environmental legislation. • Public awareness
Course Outcomes	1. Understand the concept about environmental issues and disaster management. 2: Understand participating clean and green programmes sanitation, health camps and briefing about ecosystem. 3: Develop of intelligence about health hygiene, nutritional pollution and environmental modifications. 4: Understand the management of bio medical waste and safety.
Textbooks And Reference Books	1. Textbook of environmental studies- Erach Bharucha, University PRESS (2017).

Course Title	**LAB COURSE: I: BASIC BIOCHEMISTRY**				
Course Code	SBV03291P				
Course Credits	**L**	**T**	**P**	**C**	
	-	**-**	**4**	**2**	
Prerequisites	**Theoretical Knowledge of Medical Biochemistry**				
Course Objectives	The course is focused on basic concept of chromatography,glassware handeling and instrumentation.				
Course Contents	1. Basic Lab requirements Volumetric flask, falcons, mortar and pestle, watch glass, wash bottle, beaker, measuring cylinder, dropper, burette, spatula, reagent bottle, test tube stand, pipette stand, tripod stand, Bunsen burner, wire gauze, crucible, funnel, centrifuge tubesLiver Function tests. 2. Instruments Separatory funnel, centrifuge, pH meter, Electric balance, hot plate 3. Determination of pH of various solutions using a pH meter – NaOH, sulphuric acid, distilled water. 4. Preparation of Normal solution- NaOH 5. Preparation of percentage/ vov-vol solutions- Sulphuric acid 6. Paper Chromatography- Isolation of the pigments from leaves of Raddish				
Course Outcomes	1: Acquire the knowledge about the equipments, glasswares required in the basic laboratory set up 2: Understand about the solution, solutes, and solvents 3: Identify the biomolecules by performing paper chromatographic technique. 4 : Analyze acid and base characteristics in samples 5: Determining the pH values in a given sample.				
Textbooks And Reference Books	1. Laboratory Manual of Practical Biochemistry, Shivaraja Shankara YM, 2nd Edition, Jaypee Brothers Medical Publishers.(2013)				

Course Title	**LAB COURSE II : GENERAL MICROBIOLOGY**				
Course Code	SBV03292P				
Course Credits	**L**	**T**	**P**	**C**	
	-	**-**	**4**	**2**	
Prerequisites	**Theory knowledge of Histopathology**				
Course Objectives	• The student will be able to identify the basic structure of cells, tissues and organs and describe their contribution to normal function.				
Course Contents	1: Understand about glassware about microbiology and their application. 2: Understand the serial dilution of biological samples 3: Understand about blood cells and their morphology. 4: Determine basic concept about cultivation of microorganisms.				
Course Outcomes	1. Basic Lab glassware: Test tubes, screw capped tubes, pipette, Pasteur pipettes, Erlenmeyer flask, Eppendorf tubes, pipette tips, cover slip and slides. 2. Basic Lab instrumentation: Autoclave, incubator, Hot air oven, pH meter, Centrifuge, Laminar air flow.Separatory funnel, centrifuge, pH meter, Electric balance, hot plate. 3. Serial dilution with methyl orange indicator. 4. Principles & Working of the pH meter 5. Determination of pH of water samples from different sources. 6. Determination of pH of various solutions using a pH meter – NaOH, sulphuric acid, distilled water				
Text Books and Reference Books	1. Experiments in microbiology and biotechnology, K.R. Aneja, New Age International Publishers.(2014)				

Course Title	**LAB COURSE III: FUNDAMENTALS OF MLT**				
Course Code	SBV03293P				
Course Credits	**L**	**T**	**P**	**C**	
	-	**-**	**4**	**2**	
Prerequisites	**Theoretical Knowledge of Medical Biochemistry**				
Course Objectives	This module disinged to learn about basic concept of clinical laboratory, it comprises knowledge of medical care, biosefty, concept of basic lab instruments, that supports the student to develop practical skill.				
Course Contents	1. General comments on Specimen : Blood, Urine, Stool & Semen. 2. Laboratory management 3. Planning and Medical records 4. Bio medical Waste Management : Safety measures and first aid. 5. Common laboratory equipments and their operation. 6. Cleaning and care of general laboratory glassware and equipment. 7. Principles, functions and uses of balances, centrifuge machines, colorimeters and other equipments.				
Course Outcomes	**1:** Remember the health concepts, medical care and safety regulation for the good clinical laboratory. **2:** Perceive the communication between physician and patients which is important for the medical laboratory profession. **3:** Understand about the management of the medical laboratory, planning and medical records. **4:** Understand the management of bio medical waste, safety and first aid. **5:** Understand the laboratory equipments, their uses, cleaning and care.				
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