



ANDHRA KESARI UNIVERSITY ::ONGOLE

Programme: B. Voc., Medical Laboratory Technology MAJOR
(w.e.f. Academic Year 2025-26)

COURSESTRUCTURE

Year	Semester	Paper No.	Major	Hours	Credits		
I	I	1	Microbiology-1	3	3		
			Practical	1	1		
		2	Biochemistry-1	3	3		
			Practical	1	1		
	II	3	Microbiology-2	3	3		
			Practical	1	1		
		4	Pathology-1	3	3		
			Practical	1	1		
II	III	5	Biochemistry-2	3	3		
			Practical	1	1		
		6	Pathology-2	3	3		
			Practical	1	1		
		7	Human Anatomy-1	3	3		
			Practical	1	1		
	IV	8	Physiology-1	3	3		
			Practical	1	1		
		9	Classical Laboratory Practics-1	3	3		
			Practical	1	1		
		10	Human Anatomy-2	3	3		
			Practical	1	1		
III	V	11	Physiology-2	3	3		
			Practical	1	1		
		12 A	Clinical Laboratory Practices-2	3	3		
			Practical	1	1		
		OR					
		12 B	-----		3	3	
					1	1	
		13 A	Routine Laboratory Techniques		3	3	
					1	1	
		OR					
13 B	-----		3	3			

Not : In the III Year (during the V and VI Semesters), student are required to select a pair of electives form one of the **Two** specified domains. **For example : If set 'A' is chosen, course 12 to 15 to be chosen as 12A, 13A, 14A and 15A.** To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.

AVRamesh 10/09/2025

SEMESTER-I
Course -I/ Microbiology-1
3 Hrs / Week

After completing this course, the learner will be able to:

1. To know the basics of microbiology and knowledge about the contributions of microbiologists.
2. Identify the microorganisms and the disease process as well as aseptic and sterile techniques.
3. Impart general insight into the history, bacterial genetics and serology.
4. Provide knowledge about the equipment used in microbiology and safety precautions

UNIT I

Basic principles and usage of Instruments:

General Instruments Distillation plant, Centrifuge machine, Analytical Balance, Hotplate, Magnetic Stirrer, Water Bath, Automatic dispenser and diluters, Deionizer.

Microbiological Instruments: pH-meter, Autoclave, Incubator, Hot air oven, Laminar Air flow, Colony counter, Muffle furnace, Refrigerator, Inoculator, Mc Intosh and Flides anaerobic jar.

UNIT II

Microscopy and Micrometry:

Microscopy: Study of compound microscope-magnification, numerical aperture, resolution and components of microscope. Dark ground illumination, care of microscope and common difficulties. Study of phase contrast, interference, fluorescent, polarising and electron microscope. Calibration of ocular micrometer and measurement of microorganisms.

UNIT III

Microbiology: Introduction to Microbiology, Discovery of microorganisms. Contribution of Robert Koch, Antonie Van Leeuwenhoek, Louis Pasteur, Bordet, Paul Ehrlich, Alexander Flemming, Elie Metchnikoff, Needham, Tyndall Janssen, Joseph Lister, Karl Landsteiner etc.

UNIT IV

Medical Microbiology: Scope & relevance and safety measures of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.

UNIT V

Sterilization and Disinfection: Definition, mode of action and uses of various physical methods of sterilization heat, UV radiation, ionizing radiation, character affecting sterilization, autoclave control and sterilization. Indicators. Chemical disinfectants phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compounds. Use and abuse of disinfectants. Disinfectants, anti-septics chemotherapeutic agents, chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein and nucleic acid synthesis and cytoplasmic membrane. Future development of chemotherapy.

PRACTICALS

1. Role of Microbiology Laboratory
2. Basic rules for specimen collection and handling, transportation of specimen and safety regulations.
3. Laboratory Procedures in Microbiology:
 - (a) Disinfection and sterilization
 - (b) Laboratory culture

Study of Principle and Working of:

- (a) Microscopes (all types)
- (b) Distillation apparatus
- (c) Centrifuge
- (d) Balance
- (e) De-ionizer
- (f) Ph meter
- (g) Autoclave
- (h) Incubator

Over Recommended Books/e-resources/LMS:

1. Textbook of Microbiology for Nursing Students, Anant Narayan Panikar
2. Textbook of Ophthalmology, Khurana
3. Textbook of Microbiology, Baveja.

SYLLABUS
SEMESTER-I
COURSE-2 BIOCHEMISTRY-1
Hour/Weeks: 5

Programme Learning Outcomes (PLOs) for UG courses Bachelor of Vocation in Medical Laboratory Technology

1. To develop critical thinking and problem solving.
2. To operate and maintain laboratory equipment, utilizing appropriate quality control and safety protocol.
3. To understand rigorous specimen handling protocols, prepare samples for analysis.
4. To make aware the students about human physiology and immunology.
5. To highlight the role of medical lab technician in the diagnosis of the disease.
6. To effect a transition of information and experiences learned in the MLT program to employment situations.

Biochemistry-1

After completing this course, the learner will be able to:

1. Demonstrate the knowledge of structure, function and inter- relationship of bio molecules.
2. Understand the integration of various aspects of metabolism and the irregularity pathways.
3. Know about the apparatus and re agents used in analytical and diagnostic section of biochemistry.
4. Teach about the concept to quality control.

UNIT I: Introduction to Medical Lab Technology, Role of Medical Laboratory technologists-ethics, responsibility, safety measures and hazards in clinical biochemistry, first aid (accidents).

Units of measurements, S.I. Units, measurement of volume, various volumetric apparatus (cylinders, flasks, pipettes), calibration of volumetric apparatus.

UNIT II:- Cleaning and caring of general laboratory glassware and equipment, preparation and storage of distilled water, preparation of re agent sand standard solutions, storage of chemicals and reagents, use of analytical balance, dry and moist heat radiation, filtration, autoclaving and chemical disinfection for sterilization.

UNIT III:-Introduction, aim and scope of Biochemistry. Elementary knowledge of inorganic chemistry atomic weight, molecular weight, equivalent weight, acid, bases.

UNIT IV:- Elementary knowledge of organic chemistry:

- (a) Organic compounds
- (b) Aliphatic and aromatic compounds

(c) Alcohols, Aldehydes, Ketones, Amines, Esters, Phenoletc.

UNIT V: - Viscosity principles and applications; sedimentation principles and applications; Radioisotopes and their use in Biochemistry, mole, molar, molar and normal solutions, pH measurement, buffer solutions, percent solutions, osmosis, dialysis, surface tension.

PRACTICAL: -

1. Organization of clinical laboratories
 - (a) Organizational Structure
 - (b) Functional Components
2. Study of laboratory ethics and responsibility of its workers.
3. Biohazards and Safety precautions.
4. First aid-knowledge of first aid procedures.
5. The calibration of volumetric apparatus
6. Study of cleaning and sterilization of glassware & equipments.
7. Preparation of normal, molar, molar and percent solutions.
8. Preparation of buffer solutions and determination of their pH.
9. The determination of pH using indicators.
10. The detection of changes in the confirmation of bovine serum albumin by viscosity measurements.
11. The effect of pH on the conformation of bovine serum albumin.
12. To study the phenomena of osmosis.
13. To study the phenomena of dialysis.

SEMESTER- II
SYLLABUS
Course-3 Microbiology-II
3 Hrs/ Week

Course Learning Outcomes (CLO):

After completing this course, the learner will be able to:

Know the occurrence, spread and control of bacterial infections. Provide information about bacterial culture procedures, staining procedures and biochemical tests for identification of bacteria.

Know the occurrence, spread and control of mycological infections, culture methods required to perform micro-biological tests.

To learn general characters, life cycle and laboratory diagnosis of various medically important parasites.

CLO5 is based on practical component

To train the students with knowledge of medically significant isolates in mycology, parasitology, isolation methods and treatments.

UNIT I

Cultural Media: Liquid and solid media, container for media distribution of media in tubes, bottles and petridishes. Common ingredients of cultural media, synthetic media, peptone water, nutrient agar and broth, chocolate and blood agar, malt extract and broth, milk agar etc.

Special media for Neisseria, Corynebacterium, Mycobacterium & Enterobacteriaceae group.

UNIT II

Cultivation of bacteria: Instruments used, inoculation hood, laminar flow, culture procedure, incubation (aerobic and anaerobic). Isolation of pure culture and its preservation. Blood culture. Introduction and uses of culture, classification of cultures, antimicrobial sensitivity, anaerobic cultivation techniques.

Pure culture: Maintenance and preservation of pure cultures. Collection, transport processing and storage of clinical sample for microbiological analysis.

UNIT III

Anatomy of bacterial cell, intercellular components and their functions, bacterial reproduction, morphological study of bacteria and its appendages flagella, fimbriae, pili, capsule, spore and cysts.

UNIT IV

Classification and identification of bacteria: Biological groups, morphological and biological classification, DNA composition as a basis of classification system of identification-morphology, staining reactions, cultural characters, biochemical reactions, antigenic characters and Medical importance.

UNIT V

Typical growth curve, various phases of growth physiology of bacteria-catabolism and anabolism, Nutrition of microbes and physical conditions required for growth.

Effect of carbon, nitrogen, growth factors, vitamins, temperature, pH, osmotic pressure, oxygen and carbon dioxide on microbial growth.

PRACTICALS

1. Principle, construction and working of :Microscope, Laminar Air Flow
2. Study of bacterial cell morphology
3. Isolation of pure cultures and preservation.
4. Demonstration of staining procedures for Gram staining, endospore and capsules.
5. Classification and identification of bacteria with respect to Gram Staining.
6. Study of growth curve in Bacteria and yeast
7. Preparation of culture media and technique of aseptic transfers.
8. Study of composition and preparation of stains.

Learning Resources

Recommended Books/e-resources/LMS:

1. Microbiology for Nursing and Allied Sciences. Dr. Arora 2nd Edition
2. Text book of Microbiology for Nurses Anantnarayan 1st Edition
3. Practical and Applied Microbiology Anuradha De 4th Edition
4. Text Book of Microbiology Anantnarayan 10th Edition
5. Text Book of Microbiology and Parasitology Praful Godkar 1st Edition
6. Medical Parasitology C.P. Baweja 3rd Edition.

SYLLABUS
SEMESTER- II
Course-1 Pathology-1
3 Hrs / Week

After completing this course, the learner will be able to:

1. Learn about histopathology, classification of tissues and their functions.
2. Important awareness about recording of specimens and maintaining records.
3. Gain knowledge about the morphology and anatomy of human body.
4. Use of various equipments for histology.

UNIT I

Introduction to histopathology and laboratory organization, Introduction to anatomical terms and organization of human body. Tissues - Definitions, types, classification, location and functions.

UNIT II

Management and planning, receiving and recording of specimens, indexing, maintaining records, knowledge of maintenance and use of various equipments

UNIT III

Study of: Skeletal system, bones joints and muscles. Respiratory system. Cardiovascular system. Alimentary system mechanism and physiology of digestion and absorption.

UNIT IV

Study of: Liver structure and function. Urinary system. system. Female genital, Male genital system.

UNIT V

Study of: Nervous system. Spleen, lymphnode and R.E.system. Endocrine glands and their functions.

PRACTICALS

- Study of laboratory organization related to histology and cytology –basic terminologies and specimen handling.
- Use and care of equipments, laboratory supplies and management.
- Study of tissues.
- Study of all the systems with the help of model/charts.
- Study of bones.

Recommended Books/e-resources/LMS:

1. Textbook of Medical Laboratory Technology, Volume 1,3rd by Praful Ghodkar Edition
2. Textbook of Medical Laboratory Technology, Volume 2,3rd Edition by Praful Ghodkar
3. Medical Laboratory Technology (Volume1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee Medical Laboratory Technology (Volume2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee, Medical Laboratory Technology (Volume3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee.