

First Semester Syllabus

Masters in Critical Care Science & Technology (CCST)

and Masters in Medical Laboratory Science & Technology (MLST)

Semester I

1 Semester = 26 weeks × 5 days × 5 hours = 650 hours [18 lecture hour = 1 credit (36 hours = 1 credit in practical)]

Course	Course Code	Credit	CCST	MLST
Applied Anatomy	CM101	2+1		
Applied Biochemistry	CM102	2+1		
Applied Pathology and Microbiology.	CM103	2+1		
Immunology and Parasitology	CM104	2+1		
Basic Electronics, Instrumentation & Techniques	CM105	2+1		
Communication & Soft Skills	CM106	1+0		
Introductory Critical Care Laboratory	CM107	1+2		
Introductory Medical Sc. Laboratory	CM108	1+2		
Medical Law, Record Keeping and Ethics	CM109	2+0		
Values & Indian Heritage	CM110	2+0		
Total			20	20

8 THEORETICAL COURSES (6 courses X 2 credits and 2 courses X 1 credit) & 5 PRACTICAL COURSES (4 courses 1 credit each and 1 course of 2 credits)

Total **14 credit + 6 credit**, 252 + 216 = 468 hours

Color Codes:

	Courses to be delivered exclusively by Peerless
	Courses to be jointly delivered by Peerless and RKMVERI Narendrapur
	Courses to be delivered exclusively by RKMVERI
	Courses applicable to CCST and/or MLST

CM101 Applied Anatomy Credit: 2+1 (Theory + Practical) CCST

Unit 1 Introduction to anatomy

What is anatomy? Anatomical terms; Planes and relations etc.

Unit 2 Respiratory System

Anatomy of thoracic cage bones - ribs, spine, diaphragm, intercostal muscles, blood supply and nerve supply; Anatomy of upper respiratory tract (nose to larynx) – nose, nasopharynx, oral cavity, tongue, oropharynx, laryngopharynx, blood and nerve supply; Anatomy of the lungs (trachea to bronchial tree) – lungs with bronchopulmonary segments, pleural, blood and nerve supply.

Unit 3 Cardiovascular System

Heart, pericardium, myocardium, endocardium, valves, major vessels of circulatory system – aorta, IVC, pulmonary vessels and all major branches; coronary circulation.

Unit 4 Central Nervous System

Basic organization of the nervous system – central (Brain & Spinal Cord), peripheral, autonomic nervous system and sympathetic nervous system; Cerebral circulation – Circle of Willis and blood supply of spinal cord; Pain pathway.

Unit 5 Excretory System

Kidney, ureter and bladder, blood, nerve supply

Unit 6 Abdomen

Liver, pancreas, islet cells, thyroid, parathyroid, adrenals

Practical

Clinical evaluation, case study/case book, demonstration of a cadaver, dissection, practical record, case presentation.

Recommended books:

1. Cohen, Memmler: Structure & Function of Human Body, Lippincott Williams & Wilkins; Tenth edition (2012).
2. Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd (2010)
3. Tortora: Anatomy & Physiology, John Wiley & Sons (2012)
4. Chaurasia: Human Anatomy CBS Publishers (2012)
5. Standring: Gray's Anatomy Penguin Books Ltd (2008)
6. Venkatesh D: Basics of Medical Physiology for Nursing, LWW (2009).
7. Hall J: Guyton Textbook of Medical Physiology. Elsevier (2012).
8. Tandon: Best & Taylor's Physiologic Basis of Medical Practice (2011).

CM102 Applied Biochemistry Credit: 2 + 1 (Theory + Practical) CCST & MLST

Unit 1 Carbohydrates

Glucose & Glycogen metabolism

Unit 2 Proteins

Classification of Proteins and functions

Unit 3 Lipids

Classification of lipids and functions

Unit 4 Enzymes

Definition, Nomenclature and Classification, Factors affecting enzyme activity, Active site, Co-enzyme, enzyme inhibition, unit of enzymes, iso enzyme, enzyme pattern in disease.

Unit 5 Vitamins and Minerals

Fat soluble vitamins (A, D, E, K), Water soluble vitamins (B complex vitamin); Principle elements (Calcium, Phosphorous, Magnesium, Sodium, Potassium); Trace elements : calorific value of foods – Basal Metabolic Rate (BMR), Respiratory Quotient (RQ), Specific Dynamic Action (SDA), Balanced Diet; Nutrition Marasmus, Kwashiorkor Assessment of nutrition requirements; Normal requirement of calories, proteins, fluids, electrolytes and fluid balance.

Unit 6 Acid Base Balance

Definition, pH values, Henderson-Hasselbach equation, Buffers, indicators, Normality, Molarity and Molality

Practical:

Benedict's test, Heat coagulation tests

Recommended books:

1. U. Sathyanarayana: Essentials of biochemistry. Books & Allied Publications(2013)
2. Ambika Shanmugam: Fundamentals of Biochemistry. Lippincott India (2013)
A. C. Deb: Fundamentals of Biochemistry (2001)
3. Murray: Harper's biochemistry. Mac-Graw Hill (2012)
4. Ferrier: Lippincott's Biochemistry. LWW(2013)

CM103 Applied Pathology and Microbiology Credit: 2 + 1 (Theory + Practical) CCST & MLST

Unit 1 Introduction to microorganisms

Microbiological terms; History of microbiology

Unit 2 Major groups of microorganisms

Structure and classification of microbes; identification methods of microorganisms

Unit 3 Infection control

Introduction to infection, spread and transmission of infection; sterilization and disinfection; cleaning and sterilizing equipment; disposal of wastes; surveillance & quality control; Control of organisms with antibiotics; vaccines, toxoids – bacterial, viral, immunization schedule; Barrier nursing, universal precautions.

Unit 4 Specific infections

Nosocomial infections-VAP, CRBSI, UTI; Bacterial-TB; Viral-HIV, Hep B, Corona Virus; Fungal infections; Parasitic infections; Tropical infections – TB, Malaria, Leptospirosis, Dengue, Rickettsia, Amoebiasis; Sepsis

Unit 5 Antimicrobial drug

Antibacterial, antiviral and anti-fungal agents – basic concepts; antimicrobial resistance – basic concepts and methods of circumventing antimicrobial resistance; antiseptic agents

Practical:

Collection and handling of clinical specimens – urine, sputum, blood and pus; Demonstration and handling of microscopes; Staining – Gram staining, Zeihl Neelsen; Common examination: stained smears, Fungus – yeasts and Molds; Sterilization – incineration and autoclaving; Each student will practice aseptic procedures in the wards and maintain personal and environmental hygiene; Observation visit to incinerator, posting in CSSD and infection control department.

Recommended Books:

1. Ananthnarayan R: Textbook of Microbiology. Orient Blackswan (2013)
2. Pommerville J. C: Fundamentals of Microbiology. Jones and Bartlett learning (2013)

CM104 Immunology and Parasitology Credit: 2 + 1 (Theory + Practical) MLST

Unit 1 Vector Biology

Introduction to vector fauna (arthropods and molluscs). Systematics, identification and epidemiological importance. Importance of entomology in public health. Identification of insect vectors and its epidemiological importance. General account, morphology, mouth parts and feeding mechanism, method of pathogen transmission, causal organisms, remedies and prevention with reference to bugs, lice (Anoplura and Mallophaga), flea, mosquitoes, sandfly, tsetse fly, house fly, black flies, ticks and mites, aquatic snails. Methods of vector controls (integrated, chemical, biological). Rodents as reservoirs of pathogens: Introduction to rodents. Classification of rodent with special reference to disease transmission. Disease, health hazard and control measures of rodents.

Unit 2 Protozoa

Classification, general morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of protozoan parasites: Naegleria fowleri, Giardia lamblia, Trypanosoma spp, Plasmodium spp, Cryptosporidium parvum, Cyclospora cayetanensis.

Unit 3 Trematodes

Classification, general account, primary and secondary host of trematodes, egg hatching, variation of life cycle in Monogenea and Digenea with examples. Morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Fasciolopsis buski*, *Clonorchis sinensis*, *Paragonimus westermani*.

Unit 4 Cestodes

Classification, general account, larval form of cestodes, comparative study of scolices in cestodes. Life cycle pattern of cestodes. Morphology, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Hymenolepis nana*, *Taeniasaginata* .

Unit 5 Nematodes

Classification, general account, biology, mode of transmission, pathogenicity, laboratory diagnosis and prophylaxis of *Trichuris trichura*, *Strongyloides stercoralis*, *Dracunculus medinensis*, *Brugia malayi*

Unit 6 Virus

Introduction, classification, replication and cultivation. Viral diseases of public health concern (Hepatitis A, B & C, Dengue, Mumps, Influenza and AIDS). General Introduction, seasonal outbreak of bird flu, global and national burden.

Practical:

Identification tests of parasites; microscopic identification of parasites; identification of immunological characters associated with various parasites.

Recommended Books:

1. Belding, D. L. Meredith. (1956). Textbook of Parasitology. New York. Cameron
2. T.W.M. and Black A.C.(1934). Internal Parasites of Domestic Animals London.
3. Cameron, T.W.M. (1965). Parasites and Parasitism (ELBS) John Wiley, New York.
4. Cedric Mims, et al .Medical Microbiology 3rd ed. Pub – Elsevier Musby

CM 105 Basic Instrumentation & Techniques Credit: 2 + 1 (Theory + Practical) CCST + MLST

Unit 1 Basic Instrumentations

Basic electronics & Instrumentations, Critical Care and imaging devices e.g. ventilators, ultrasonography, electrocardiography, CAT, Scan, MRI etc – basic principle, instrumentation and applications.

Unit 2 Basics of Molecular Interactions

Units of measurement of solutes in solution; Normality, molarity, and ppm; Cells & organelles, Protein, DNA, Lipids, Thermodynamics and kinetics of molecular interactions

Unit 3 Basic Techniques

Hydrodynamic methods, Principles of electrophoresis, PAGE, Isoelectric focusing and 2DGE, Basic principles and types of centrifugations, Chromatography, principles of adsorption, partition and ion-exchange chromatography, gel permeation chromatography

Unit 4 Spectroscopy

Spectroscopic techniques & radioactivity, Energy, wavelength, electronic absorption, Beer-Lambert's law, light absorption, transmittance, UV-visible spectrophotometry, Fluorescence spectroscopy, basic principles, instrumentation and applications of NMR and imaging.

Unit 5 Radioactivity

Radioactive isotopes, half-life and decay, α , β and γ -rays, principles of scintillation counting, GM counters, applications of isotopes, autoradiography, radio-labelled biomolecules

Unit 6 Microscopic techniques

Light Microscopy: lenses and microscopes, resolution, Differential interference contrast and fluorescence microscopy; Confocal microscope: confocal principle, resolution, multiphoton microscopy; principles & applications of electron microscopy, flow cytometry, mass spectrometry

CM 106 Communication and Soft Skills Credit: 1+0 (Theory + Practical) CCST + MLST

Unit 1 Soft Skill Development

CV draft, Social Media Skills, Corporate LinkedIn Profile Construct and Networking, Official Twitter Profile Construct and Networking, Mental Health, Facing a panel (interview, proposal, research plan, business plan etc.), Body Language, and the Power of Intention.

Unit 2 Pitching

Non-verbal communication; Behaviour; Power Point Presentation; Verbal Communication; Elevator Pitching; Legal documentation; Written communications

Practical:

CV draft; Notice draft; Application draft; Paper Presentation; Concept pitching

Recommended Books:

1. Gallo, C. (2018) Five Stars: The Communication Secrets to Get from Good to Great. St. Martin Press, New York

CM107 Introductory Critical Care Laboratory Credit: 2+1 (Theory + Practical) CCST

Unit 1 General

Inflammation and healing, Tumors, Immune system.

Unit 2 Respiratory System

Respiratory failure, Adult respiratory distress syndrome, Pneumonia, TB, Opportunistic infections, Bronchial asthma and COPD, Bronchiectasis and Lung abscess, Atelectasis, Collapse, Pleural disease: Pneumothorax, pleural effusion, Occupational lung diseases-smoke inhalation, pneumoconiosis.

Unit 3 Cardiovascular

Shock: Hypovolemic, Cardiogenic, Obstructive, Septic; Hypertension in ICU; Congestive cardiac failure; Acute left ventricular failure; Right ventricular failure; Pulmonary edema; Pulmonary hypertension; Pulmonary embolism; Ischemic heart disease.

Unit 4 CNS

Cerebro vascular disease (stroke); Coma; Delirium in ICU; Neuromuscular disease; Myasthenia gravis; Critical Illness Polyneuropathy; Diaphragmatic paralysis; Guillian Barre syndrome; Brain Death, Persistent vegetative state; Trauma, head injury, unstable spine and protection.

Unit 5 Hematology

Anemia in ICU, Neutropenia, Bleeding disorders, clotting disorders

Unit 6 GIT, Liver, Pancreas, Renal, Endocrine

Upper GI bleed, Hepatic Coma, Pancreatitis, Renal failure in ICU, Hypoglycemia, Hyperglycemia, Disorders of sodium, potassium and fluid balance, Stress response route of adrenal.

Unit 7 Miscellaneous

Envenomation – snake bite, scorpion sting; poisoning – general care, common poisons.

Practical:

As deemed appropriate

Recommended books:

1. Smeltzer – Brunner & Suddharth- Textbook of Medical Surgical Nursing, 2010, LWW
2. Black – Medical Surgical Nursing, 2009, Elsevier
3. Nettna – Lippincott manual of Nursing Practice, 2009. LWW
4. Lewis – medical Surgical Nursing, 2008, Elsevier
5. Davidson’s Principles & Practice of Medicine, 2010, Elsevier
6. Bailey & Love Short Practice of Surgery, 2008, Hodder Arnold
7. Timby – Introductory Medical Surgical Nursing, 2009, WK
8. Das – textbook of Surgery, SD Publishers
9. Woods – Cardiac Nursing, 2010, LWW
10. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
11. Morton – Critical Care Nursing, 2009, LWW
12. Thelan’s Critical Care Nursing, 2008, Elsevier
13. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
14. Webber – Health assessment in Nursing, 2010, WK

CM108 Introductory Medical Science Laboratory Credit: 1+2 (Theory + Practical) MLST

Unit 1 RBC

RBCs, formation, morphology, cytoskeleton, anisocytosis, poikilocytosis, metabolism, role of 2, 3- BPG and oxygen dissociation curve. Anaemia and its classification, Morphological and etiological, pathogenesis, laboratory investigations and management, Iron deficiency anaemia, metabolism of iron, pathogenesis, laboratory investigations and management, principle and procedure of special test Megaloblastic anaemia, pernicious anaemia, pathogenesis, laboratory investigations

Unit 2 Haemoglobin

Haemoglobin, its synthesis and types, normal and abnormal hemoglobins, extravascular and intravascular hemolysis. Haemolytic anaemia, pathogenesis and laboratory investigations, principle and procedure of special test, G-6-PD

Unit 3 Leukopoiesis

Leukopoiesis , Stages of Leukocyte Maturation, Features of Cell Identification, leucocytosis and leucocytopenia , neutrophilia , eosinophilia, basophilia, monocytosis, lymphocytosis, neutropenia, lymphopenia, causes and significance, toxic granulation, Morphological alterations in neutrophil, effect of HIV on blood cell parameter

Unit 4 Hemostasis

Overview of hemostasis and coagulation, Stages of platelets development, Primary and Secondary hemostasis, Role of platelets, Role of coagulation factors, Coagulation inhibitory system, Fibrinolysis

Unit 5 Blood

General blood picture, estimation of iron, TIBC, Transferrin, Ferritin, Plasma haemoglobin, Vit.B12, Folic acid, FIGLU test, Schiling test, Parietal cell antibodies, G-6-PD, Osmotic fragility test, Heinz bodies, Perls Prussian staining, Platelet count, Platelet aggregation test, PT, INR APTT, Mixing experiments in PT and APTT, Thrombin time.

Practical:

As deemed fit in every unit

Recommended books:

1. Mukherjee .L.K(2017), Medical Laboratory Technology, Vol.1-3, 3rd edition, Tata Mcgraw Hill
2. Sood Ramnik,(2015), Text book of Medical Laboratory Technology, 2nd edition, Jaypee Publications
3. Wintrobe's Clinical Haematology,(2014), 13th edition, Lippincott Williams & Wilkins
4. De Gruchy's Clinical Haematology in Medical Practice,(2012), Sixth edition, Wiley Publications
5. Dacie & Lewis Practical Haematology, (2011), 11th edition, Elsevier Publications

CM109 Medical law, Record Keeping and Ethics Credit: 2+0 (Theory + Practical) CCST + MLST

Unit 1. History of Development of Medical Records

During different periods: Early Ancient Times to Renaissance Period (16th &17th Centuries); 18th -20th Centuries and Till Date; In U.S.A.; At International Level; In India.

Unit 2 Characteristics of quality Medical Records

Definition, Characteristics of 'Good' Medical Record; Values of 'Good' Medical Record to various users; Required Characteristics of entries in medical Records; Responsibility for Medical Record Quality Source-oriented, Problem-oriented, and Integrated medical records; Medical Record Forms and their Content Standard Order of Arrangement of Medical Record forms; Analysis of Medical Record-Quantitative & Qualitative Incomplete Record Control

Unit 3 Differential Medical Records

Medical Records for different patient encounters with health care facility: i. Ambulatory Care Records {Emergency & Outpatient Records} ii. Clinical Records in Long Term Care and Rehabilitation Facilities iii.Mental Health Records

Unit 4 Filing Methodology

Filing Methods, Storage, and Retention Numbering and Filing Systems; Filing Storage-Microfilming and Disk Storage Retention Registers & Indexes Record movement control

Unit 5 Organizational aspects

Organizational Aspects of Medical Record Department/Services Policies Functions Location, Space and Layout Equipment Forms Designing and Control Medical Records Flow and Processing; Organizational Aspects of the Centralized Admitting Services Principles of Identification of a Patient Methods of Collection of Identification Data Types of Central Admitting Services Admitting Policies Procedure Outlines for Admissions Flow of Records following Admissions Advantages of good Admitting Policies and Procedures Pre-requisites for smooth & efficient functioning of the Centralized Admitting Services

Unit 6 Management

Medical Record Department Management i. Planning, Organizing, Directing and Controlling ii. Personnel iii.Principal Responsibilities and Duties of the Medical Record Administrator/ Director iv.Tools of Management in the Hands of the Medical Record Administrator/ Director

Unit 7 medico-Legal Aspects

Medico-Legal Aspects of the Medical Records 1. Medical Ethics , Hippocratic Oath, and Code of Ethics for the Medical Record Professionals 2. Ownership of the Medical Record Privileged

Practical:

None

Recommended books:

1. Online links from Pubmed etc

CM110 Values and Indian Heritage Credit: 2+0 (Theory + Practical) CCST + MLST

Unit 1 About India

India's Eminence, Life-centre, Mission and Future

Unit 2 Present Decadence

Its Causes-We are to blame, Ignoring the past, Narrowing our Outlook, Perversion of Religion, Tyranny over the masses, Neglect of women; Its symptoms and cures – Cultural heresy and Fanaticism, Physical weakness, lack of faith in ourselves, lack of Self-help, Lack of obedience, Laziness, Selfishness and Jealousy, Lack of organizing capacity, Lack of business integrity, Lack of love, Charge to national workers

Unit 3 Essentials for Regeneration

Training sincere workers, Deluging the land with spiritual ideals, Social reform and its methods

Unit 4 Education the panacea of all social evils

The present system; True education; Ideal method; Brmhacharya; Shraddha; Character; Communication with Nature; Gurukula system; Psychological Approach: Present need and the Swami's Plan

Unit 5 Uplift of the Masses

Their worth; Their present condition and its cause; Its remedy and our responsibility

Unit 6 Caste Problem

Caste in society and not in religion; the underlying idea of caste system; Inequality of privilege; Untouchability; Solution

Unit 7 Uplift of Women

Hindu women ideal; Social status-ancient and modern; Upliftment of Women; Education; The Swami's Plan

Unit 8 Invigorating Cultural Life

Presentation of cultural integrity; Broadening of cultural outlook; Two View-points: Eastern and Western; Both necessary for Human Progress; Propagation of Indian Culture

Practical:

None

Recommended Books:

1. Nirvedananda, Sw. (2018) Twenty-third Reprint, Advaita Ashrama