# DAYANANDA SAGAR UNIVERSITY

SHAVIGE MALLESHWARA HILLS, KUMARASWAMY LAYOUTBENGALURU – 560 111, KARNATAKA.

## COLLEGE OF ALLIED HEALTH SCIENCES

# SYLLABUS FOR FIRST YEAR

## B.Sc. ALLIED HEALTH SCIENCES – 2021

## COMMON TO ALL PROGRAMS

## (With effect from 2021-22)

| COURSE CODE | COURSE TITLE |
|---|---|
| 21AL1101 | ANATOMY |

**UNIT – 1 (3Hrs)**

**INTRODUCTION Theory:**

- Definition of anatomy and its sub divisions
- Terms of location, positions and planes
- Epithelium-definition, classification with examples
- Glands- classification, types of glands with examples
- Basic tissues – classification with examples

**Practical (1Hr)**

- Histology of types of epithelium
- Histology of serous, mucous & mixed salivary gland

**UNIT – 2 ( 5 Hrs)**

**CONNECTIVE**

**ISSUE Theory:**

- Cartilage – types , microscopic features with example
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, fontanels of foetal skull.
- Joints – Classification of joints with examples.
- Muscular system: Types of muscular tissue & microscopic structure.
- Names of muscles of the body

**Practical: (3Hrs)**

- Histology of the 3 types of cartilage
- Histology of compact bone

Histology of skeletal & cardiac muscle

- Demo of all bones showing parts, radiographs of normal bones & joints
- Demonstration of important muscles of the body

**UNIT – 3 (13 Hrs)**

**CARDIOVASCULAR**

**SYSTEM Theory:**

- Heart-size, location, chambers, external features, pericardium
- Blood supply of heart
- Systemic & pulmonary circulation
- Branches of arch of aorta, blood supply of limbs
- Inferior vena cava, portal vein, portosystemic anastomosis, Great saphenous vein.
- Lymphatic system-Names of Regional lymphatics, axillary and inguinal lymph nodes

**Practical: (3Hrs)**

- Demonstration of heart and vessels in the body
- Histology of large artery & vein, medium sized artery
- Histology of lymph node, spleen, tonsil & thymus
- Radiology: Normal chest radiograph showing heart shadow

**UNIT – 4 (9Hrs)**

**Gastro-Intestinal System Theory:**

Parts of GIT: Oral cavity ( tongue (with histology), tonsil) pharynx, salivary glands, Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen. **Practical: (1Hr)**

- Demonstration of parts of
- GIT Radiographs of abdomen

**UNIT – 5 (7Hrs)**

**RESPIRATORY SYSTEM**

**Theory:**

- Parts of RS: nasal cavity, larynx, trachea, lungs, broncho pulmonary segments, diaphragm
- Histology of trachea, lung
- Names of paranasal air sinuses

**Practical: (3Hrs)**

- Demonstration of parts of respiratory system.
- Normal radiographs of chest, paranasal
- sinuses Histology of lung and trachea

**UNIT – 6(4 Hrs)**

**URINARY SYSTEMS Theory:**

- Kidney, ureter, urinary bladder
- Histology of kidney, ureter and urinary bladder

**Practical: (3Hrs)**

- Demonstration of parts of urinary system
- Histology of kidney, ureter, urinary bladder

**UNIT – 7 (5 Hrs)**

**REPRODUCTIVE SYSTEM**

**Theory:**

- Parts of male reproductive system, testis, vas deferens, prostate (gross & histology)
- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland – gross

**Practical: (1Hr)**

- Demonstration of section of male and female pelvis with organs in situ
- Histology of testis, vas deferens, prostate, uterus, fallopian tubes, ovary
- Radiographs of pelvis – hysterosalpingogram

**UNIT – 8 (2 Hrs)**

**ENDOCRINE GLANDS**

**Theory:**

Names of all endocrine glands. Pituitary gland, thyroid gland& suprarenal gland, Islets of Langerhans of pancreas – in detail (gross & histology)

**Practical: (1Hr)**

- Demonstration of the glands
- Histology of pituitary, thyroid, suprarenal glands

**UNIT – 9 (10 Hrs)**

**NERVOUS SYSTEM**

**Theory:**

- Classification of Nervous system. Types of Neuron
- Cerebrum, cerebellum, spinal cord (gross & histology)Meninges & Ventricles
- Names of arteries supplying the brain
- Names of Cranial nerves

**Practical: (2Hrs)**

- Histology of peripheral nerve & optic nerve
- Demonstration of major nerves in the body
- Demonstration of all parts of brain
- Histology of cerebrum, cerebellum, spinal cord

**UNIT – 10 (5 Hrs)**

**SENSORY ORGANS**

**Theory:**

- Names of Sensory organs
- Skin: Skin-histology (thick & thin)
- Eye: Parts of eye, Extra-ocular muscles & nerve supply
- Ear: parts of the ear

**Practical: (2 Hrs)**

- Histology of thin and thick skin
- Demonstration and histology of eyeball

| COURSE CODE | COURSE TITLE |
|---|---|
| 21AL1102 | PHYSIOLOGY |

# THEORY

**UNIT – 1 (2 Hrs) General physiology**

1. Cell structure and function, Transport across cell membrane
2. Homeostasis, body fluid compartments and measurements

**UNIT – 2 (11 Hrs) Blood**

1. Composition and function of blood and plasma proteins
2. RBC – morphology, types, functions, production, stages of differentiation
3. Factors affecting erythropoiesis, normal values, variations, ESR, PCV, osmotic fragility, blood indices
4. Hemoglobin – structure, functions, normal concentrations, types, fate of hemoglobin,.
5. Jaundice – types, anaemia – types
6. WBCs- morphology, production, functions, normal count
7. Immunity – humoral immunity
8. Immunity – cellular immunity
9. Platelets – morphology, normal count, functions, platelet plug
10. Hemostasis – definition, steps in hemostasis, clotting factors, mechanism, anticoagulants, bleeding and clotting disorders
11. Blood group – ABO and Rh system, Rh incompatability, blood grouping and cross matching, hazards of mismatched blood transfusion.

**UNIT – 3 (5 Hrs)**
**Nerve-Muscle Physiology**

1. Neuron- structure, types, properties, RMP and action potential, neuroglia-types, nerve fibre classification, Wallerian degeneration
2. NMJ, impulse transmission across NMJ, Myasthenia gravis;
3. Skeletal muscle - structure, sarcomere, Contractile proteins, properties, Types of contraction; Motor unit, muscle fatigue, Excitation contraction coupling, mechanism of muscle contraction;
4. Properties of cardiac muscle
5. Smooth muscle-types and properties;

**UNIT – 4 (7 Hrs)**
**Respiratory system**

1. Physiological anatomy of respiratory system, muscles of respiration, respiratory & non respiratory functions of lungs
2. Dead space; Mechanics of breathing, intrapulmonary & pleural pressures, compliance, surfactant
3. Lung volumes and capacities

4. Respiratory membrane, transport of O2 & CO2
5. Neural and chemical regulation of respiration
6. Hypoxia, Acclimatization, Dysbarism - definition and types Artificial respiration,
7. Periodic breathing, dyspnoea, apnoea, asphyxia, cyanosis-definition and types

**UNIT – 5 (7 Hrs) Cardiovascular system**

1. Introduction to CVS & general principles of circulation,
2. Cardiac cycle, heart sounds;
3. Cardiac output, factors and measurement
4. Blood Pressure – definition, variations, factors affecting blood pressure, regulation of BP
5. ECG -uses and significance, normal waveforms
6. Coronary circulation, cutaneous circulation-triple response, shock
7. Effects of exercise on CVS and respiratory system

**UNIT – 6 (8 Hrs) Renal system**

1. Kidneys- Nephron- structure and types, juxtaglomerular apparatus-structure and functions, non- excretory functions of kidney
2. Glomerular filtration rate (GFR)- definition, normal value, factors affecting GFR
3. Tubular reabsorption - sites, substance reabsorbed, mechanisms of reabsorption
4. Tubular secretion- sites, substance secreted, mechanisms of secretion
5. Counter current mechanism of concentration of urine, definition of obligatory and facultative reabsorption of water
6. Micturition reflex, Diuretics,
7. Artificial kidney, renal function and clearance tests
8. Skin -structure and function. Body temperature measurement, physiological variation, regulation of body temperature.

**UNIT – 7 (6 Hrs) Digestive system**

1. Physiological anatomy, enteric nervous system & functions of GIT Saliva- composition, regulation, disorder. Deglutition-stages & disorders
2. Stomach-functions, composition and regulation of gastric juice
3. Pancreas- function, composition and regulation of pancreatic juice
4. Liver & gall bladder-functions, bile- composition, secretion and regulation
5. Small intestine- succus entericus-composition, functions & movements, Large intestine functions, movements and defecation reflex

6. Digestion & absorption of Carbohydrates, fats and proteins.

**UNIT – 8 (24Hrs) Endocrine system**

1. Classification of endocrine glands & their hormones; Posterior pituitary hormones- secretion, functions & disorders, Anterior pituitary hormones- secretion, functions & disorders

2. Thyroid hormones- secretion, functions & disorders, Parathyroid hormones- secretion, functions
& disorders Calcium homeostasis & disorders

3. Pancreatic hormones -secretion, functions & disorders

4. Adrenal cortex- Glucocorticoids, Mineralocorticoids & Androgen - secretion, functions, disorders
Adrenal medulla- secretion, functions, disorders

**UNIT – 9 (4 Hrs) Reproductive system**

1. Introduction to reproductive system, Puberty, Male reproductive system, functions of testosterone & Spermatogenesis
2. Female reproductive system, functions of Estrogen, Progesterone, Oogenesis Ovulation & Menstrual cycle,
3. Physiological changes during pregnancy, pregnancy tests; Parturition & lactation
4. Male & female contraceptive methods.

**UNIT – 10 (13 Hrs) Central nervous system**

1. Introduction to CNS, sensory receptors classification, properties, synapse– classification, properties
2. Sensory and motor pathways -Anterior spino thalamic tract and Posterior column pathway
3. Lateral spino-thalamic tract, pain –types, theories of referred pain, UMN and LMN lesions
4. Thalamus; nuclei and function
5. Classification of reflexes, stretch reflex, muscle spindle, inverse stretch reflex. Polysynaptic reflex- withdrawal reflex
6. Cerebral cortex (Sensory and motor)-functions
7. Medulla and Pons-functions,
8. Cerebellum – functions, disorders
9. Basal ganglia-functions, disorders
10. Hypothalamus and Limbic system, functions;
11. CSF, lumbar puncture
12. Sleep, EEG
13. Autonomic Nervous System - sympathetic and parasympathetic distribution and functions

**UNIT – 11 (3 Hrs) Special senses**

1. Vision –functional anatomy of eye, visual pathway and lesions of visual pathway, refractive errors, color vision
2. Audition – physiological anatomy of ear, mechanism of hearing, deafness, TFT.
3. Olfaction – modalities, receptor, function, abnormalities Gustation-modalities, receptor, function, taste pathway, abnormalities.

## PRACTICALS (20 Hrs)

1. Study of compound microscope
2. Estimation of haemoglobin
3. Determination of differential leucocyte count
4. Determination of blood groups
5. Recording of Blood pressure
6. Auscultation for Heart Sounds
7. Determination of vital capacity
8. Artificial respiration

| COURSE CODE | COURSE TITLE |
|---|---|
| 21AL1103 | BIOCHEMISTRY - I |

**UNIT – 1 (3 Hrs)**

**Carbohydrate Chemistry**

- Classification (Definition/ examples for each class)
- Monosaccharaides (classification depending upon number of carbon atoms and functional group with examples)
- Disaccharides (Sucrose/ lactose/ maltose and their composition)

**UNIT – 2 (3 Hrs)**

**Lipid Chemistry**

- Definition of lipids
- Functions of lipids in the body
- Classification of lipids (subclasses with examples)
- Definition and Classification of fatty acids
- Essential fatty acids

**UNIT – 3 (3 Hrs)**

**Amino-acid and Protein Chemistry**

- General structure of D and L amino acids
- Amino acids: Definition and Classification of amino acids with examples.
- Peptides; definition & Biologically important peptides
- Classification of Proteins based on composition, functions and shape (with examples)
- Functions of amino acids and Proteins.

**UNIT – 4 (3 Hrs)**

**Nucleotide and Nucleic acid Chemistry**

- Nucleosides & Nucleotides
- Nucleic acid Definition & types
- Composition & functions of DNA, Composition, functions and types of RNA.

- Structure of DNA (Watson and Crick model)
- Structure of tRNA.
- Difference between DNA and RNA.

**UNIT – 5 (5 Hrs)**

**Enzymes**

- Definition & Classification of Enzymes with example
- Definitions of Active site, Cofactor (Coenzyme, Activator),
- Proenzyme; Definition and examples (Pepsin & trypsin).

**UNIT – 6 (3 Hrs)**

**Digestion and Absorption**

- General characteristics of digestion and absorption,
- Digestion and absorption of carbohydrates, proteins and lipids.

**UNIT – 7 (5 Hrs)**

**Carbohydrate Metabolism**

- Glycolysis; Aerobic, Anaerobic, Definition, Site and subcellular site, Steps with all the enzymes and coenzymes at each step, and Energetics.
- Citric acid cycle; Pyruvate dehydrogenase complex (reaction and coenzymes), Site and subcellular site, Reactions with all the enzymes and coenzymes, and Energetics.
- Diabetes mellitus (definition, classification, signs and symptoms)

**UNIT – 8 (4 Hrs)**

**Lipid Metabolism**

- Beta oxidation of fatty acids ; Definition ,Site and subcellular site , Activation of palmitic acid , Transport of activated palmitic acid into mitochondria , Reactions , Energetics.
- Name the different ketone bodies. Note on ketosis.

**UNIT – 9 (3 Hrs)**

**Amino acid and Protein Metabolism**

- Introduction, transamination, deamination.
- Urea cycle-steps, site and energetics.

**UNIT – 10(3 Hrs)**

**Vitamins**

- Definition and classification with examples.
- RDA, sources, coenzyme forms, biochemical functions and deficiency disorders for the following fat soluble vitamins; A and vitamin D.

**UNIT – 11(3 Hrs)**

**Mineral Metabolism**

- Name the macro/ micro minerals.
- Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
- Calcium and phosphorus: Sources, RDA, functions, normal serum levels and hormones regulating their levels.

**UNIT – 12(6 Hrs)**

**Nutrition**

- Balanced diet (Definition)
- Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
- Total daily caloric requirements of an adult male and female,
- RDA (Definition, standard values for nutrients)
- Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women, Factors affecting BMR
- Carbohydrates; Daily dietary requirement. Dietary fibres (Definition, functions, importance and their daily requirements)
- Proteins; Daily requirement, Biological value.

Mutual supplementation of proteins (Definition, examples).

- Fats; Daily requirement, Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations), Saturated and unsaturated fatty acids (Definition, sources, examples).

**UNIT – 13(6 Hrs)**

**Renal Function Tests**

- Name the different tests to assess the kidney functions. Tests to glomerular function.
- Explain Creatinine clearance & Inulin clearance.

**UNIT – 14(1 Hr)**

**Radioactive Isotopes**

- Definition, clinical applications
- Biological effects of radiations

**UNIT – 15(5 Hrs)**

**Clinical Biochemistry**

A. Definitions of acid, base, pH and pKa [1 hour]

B. Buffers • Definition [2 hours]

- Henderson Hassel Balch equation,
- Principal buffer systems in the ECF, ICF and urine
- Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)

- Acidosis & Alkalosis (Definition, classification, causes).

C. Normal serum levels and condition where they are altered [2 hour]

- Glucose, Protein, urea, uric acid, and creatinine
- Bilirubin, cholesterol
- Serum Electrolytes

**UNIT – 16(1 Hr)**

**Fundamental Chemistry**

Valency, Molecular weight & Equivalent weight of elements and compounds. Normality, Molarity, Molality. Molar and normal solution.

ASSIGNMENT TOPICS

1. Units of measurement
2. Hazards - Physical, Chemical, Biological
3. Arterial blood gas analysis
4. Responsibilities of Health care personnel
5. Biomedical waste management

**PRACTICAL DEMONSTRATION [20 hours]**

- Reactions of Carbohydrates (Glucose, Fructose and Sucrose)
- Colour reactions of amino acids (Albumin and Casein)
- Colorimetry
- Estimation of Blood glucose
- Estimation of Urea

| COURSE CODE | COURSE TITLE |
|---|---|
| 21AL1104 | PATHOLOGY - I |

**UNIT – 1 (1 Hr)**

**Introduction to clinical Pathology:**

1. Definition of clinical pathology.
2. Objectives of clinical pathology.
3. Sampling and analysis of samples obtained.

**UNIT – 2 (9 Hrs)**

**Urine Examination:**

1. Urine Formation
2. Indications for urine analysis
3. Collection
4. Physical Examination- volume, colour,appearance, odour, specific gravity, ph and pathological conditions associated with thevariations.
5. Chemical Examination - describe the principle, method and interpretation of tests for sugar, proteins, ketone bodies, blood, bile salts,bile pigments and pathological conditions associated with the variations.
6. Microscopic Examination- cells, casts,crystals, organisms
7. Dipstick Method- Principal, Types ofDipstick, Interpretation, Quality Control

**UNIT – 3 (2 Hrs)**

**Examination of CSF:**

- Brief on CSF formation
- Collection
- Preservation and Transport
- Indications and complications of lumbar puncture
- Physical Examination- gross appearance

□ Chemical Examination- estimation of proteins and glucose □
Microscopy – Preparation & staining of smear, cell count, cell type □
Microbiological examination

**UNIT – 4 (4 Hrs)**

**Examination of the other body fluids:**

1. Brief on pleural, peritoneal, pericardialand synovial fluids
2. Collection, preservation and transport
3. Indications
4. Difference between exudate and transudate
5. Physical examination- appearance
6. Chemical examination
7. Microscopy- smear preparation , staining, cell count and cell type
8. Microbiological examination

**UNIT – 5 (2 Hrs)**

**Sputum Examination:**

1. Indications for sputum examination
2. Methods of Sputum collection
3. Cytological examination- smear preparation, staining
4. Microbiological examination- gram staining, ZN staining

**UNIT – 6 (2 Hrs)**

**Stool Examination:**

1. Introduction
2. Chemical examination- occult blood
3. Microscopic examination- preparation of slide and microscopy for ova and cyst

**HEMATOLOGY**

**UNIT – 7 (2Hrs)**
**Introduction to Hematology:**

1. Definition of hematology

2. Describe normal hematopoiesis
3. Extramedullary hematopoiesis

**UNIT – 8 (7Hrs)**

**Normal constituents of Blood, their Structure and Functions:**

1. Enumerate components of blood- RBC, WBC,Platelets and Plasma
2. RBC- Structure and function
3. WBC- Types, Structure and function
4. Platelets- Structure and function

**UNIT – 9 (5Hrs)**

**Collection of blood Samples:**

1. Methods and Procedure of collection ofblood
2. Precautions to be taken while collectingblood
3. Vacutainers- types, color, contents and uses
4. Anticoagulantics – types and uses

**UNIT – 10 (8 Hrs)**

**Normal Hemostasis:**

1. Define normal hemostasis
2. Mechanism of primary and secondary hemostasis.

**BLOOD BANK-**

**UNIT – 11 (1Hr)**

**Introduction to Blood Banking:**

1. Describe blood banking
2. Types of blood bags
3. Storage of blood
4. Blood components

5. Instruments in blood bank

**UNIT – 12 (3 Hrs)**

**Blood Grouping System:**

1. Classify different blood group systems
2. Mention importance of Rh factor
3. Enumerate steps of ABO grouping and Rhtyping
4. Describe ABO and Rh incompatibility

**UNIT – 13 (4 Hrs)**

**Principles of Blood Transfusion:**

1. Blood donor selection
2. Donors bleeding techniques
3. Blood containers, anticoagulants and storage of blood
4. Coomb's test and its significance
5. Screening of blood for infective material
6. Blood components, preparation & component therapy
7. Autologous transfusion
8. Transfusion reactions and work up
9. Blood bank organization, standards, procedures, techniques and quality control.

**GENERAL PATHOLOGY**

**UNIT – 14 (7 Hrs)**

**Cell Injury:**

1. Definition and causes of cell injury.
2. Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.
3. Types of cell injury – Reversible and irreversible; morphology of reversible injury.
4. Necrosis – Definition and patterns of tissue necrosis.
5. Pathologic calcification – Types and examples

**UNIT – 15 ( 7 Hrs)**

**Inflammation:**

1. Definition and signs of inflammation.
2. Types – Acute and chronic inflammation.
3. Acute inflammation – Causes, morphologicalpatterns and outcome.
4. Chronic inflammation – Causes, morphology andexamples.
5. Regeneration and repair – Mechanism ofcutaneous wound healing.
6. Factors affecting wound healing.

**UNIT – 16 (5 Hrs)**

**Hemodynamic Disorders:**

a. Edema – Definition, pathogenesis and types: Renal, cardiac, pulmonary and cerebral.
b. Difference between transudate and exudate.
c. Shock – Definition, types of shock with examples: Hypovolemic, cardiogenic and septicshock, stages of shock: Non progressive, progressive and irreversible.
d. Thrombosis – Definition, mechanism of thrombus formation (Virchow's triad) and fate ofthrombus.
e. Embolism – Definition and types: Thromboembolism, fat, air and amniotic fluidembolism.
f. Infarction Definition and examples

**UNIT – 17 (5 Hrs)**

**Immune System:**

- Autoimmune diseases – General features, enumerate systemic and organ specific autoimmunediseases.
- Systemic lupus erythematosus – Manifestationsand diagnosis.

**UNIT – 18 (8 Hrs)**

**Neoplasia:**

1. Definition and nomenclature of tumors.
2. Differences between benign and malignantneoplasms.
3. Modes of spread of tumors.
4. Clinical aspects of neoplasia.
5. Laboratory diagnosis of cancer

## PRACTICALS

### Urine Analysis: (6 Hrs)

1. Physical Examination – Volume, Colour, Ph, Specific Gravity, Odour
2. Chemical Examination
   i. Albumin – Heat coagulation test, SSANitric acid ( Hellers ) Dipstick method
   ii. Sugar -Benedicts Test, Dipstick Method
   iii. Ketonebodies - Rotheras Test, Dipstick Method
   iv. Blood - Benzidine test, Dipstick Method
   v. Bile salts & Pigments : Hays test, Fouchets test, Dipstick Method
3. Microscopic Exam: - Crystals, Casts, Cells

### Blood Grouping and Rhtyping: (4 Hrs)

Slide method - Principle, Procedure and interpretation

### Histopathology: (10Hrs)

Section cutting and H&E Staining: Procedure of microtomy

| COURSE CODE | COURSE TITLE |
|---|---|
| 21AL1105 | MICROBIOLOGY |

**INTRODUCTION**

**UNIT – 1 (6 Hrs)**

**A) History of Microbiology:**

1. Louis Pasteur
2. Antony van Leeuvenhoek
3. Robert Koch
4. Edward Jenner
5. Alexander Fleming

**B) Microscope:**

- Use of microscope in the study of bacteria
- Types of microscopes :
- Compound microscope Phase
- contrast microscope Electron
- microscope Fluorescent
- microscope Dark ground
- microscope

**C) Morphology of Bacterial Cell:**

Cell envelope Cell interior Additional structures

**UNIT – 2 (5 Hrs)**

**GROWTH AND NUTRITION**

**Nutrition, Growth and Multiplication of Bacteria:**

a) Bacterial growth curve:
   I. Lag phase, Log phase, Stationary phase and Decline phase
   II. Bacterial counts

b) Culture Media:
   i. Types
   ii. Preparation of culture media
   iii. Uses

c) Culture Methods:
   i. Aerobic culture methods
   ii. Anaerobic culture methods.

**UNIT – 3 (6 Hrs)**

**Sterilization and Disinfection:**

a) Introduction

b) Classification of Sterilisation

   i . Equipments used in Sterilisation: Autoclave, Hot air oven, Inspissator etc.
   iii. Filtration, Radiation

c) Disinfectants

   i. Classification of Disinfectants
   ii. Methods to test efficacy of disinfectants
   iii. Chemicals used in disinfection
   iv. Methods to test efficacy of disinfectants

**UNIT – 4 (2 Hrs)**

**Biomedical Waste Management:**

- Introduction
- Waste generated in hospitals
- Waste Segregation in hospitals
- Treatment and disposal methods
- Monitoring of BMW management

**UNIT – 5 (6 Hrs)**

1. **Immunology**
   a) Immunity

i. Definition
ii. Mechanism of immunity iii. Innate immunity
iv. Acquired immunity b) Vaccines :
i. Types
ii. Vaccination schedule for laboratory personale
**iii.** Immunization schedule c) Antigen
i. Definition ii. Types
d) Antibody
iii. Definition
iv. Types
e) Hypersensitivity :
i. Definition
ii. Classification

**UNIT – 6 (6 Hrs)**

**Infection:**

- Definition
- Types
- Mode of transmission
- Hospital acquired infection – Types, causative agents, mode of transmission and prophylaxis
- Antimicrobial sensitivity testing

**UNIT – 7 (5Hrs)**

**Systematic Bacteriology:**

**Disease caused and laboratory diagnosis of medically important bacteria:**

- Staphylococcus
- MRSA
- Mycobacterium tuberculosis

**UNIT – 8 (15 Hrs)**

**Parasitology:**

a) Introduction to Parasitology

b) List of medically important parasites and diseases:

- E.histolytica
- Plasmodium
- Laboratory diagnosis of parasitic infection

**UNIT – 9 (10 Hrs)**

**Virology:**

- Introduction
- List of medically important viruses and diseases
- AIDS
- Hepatitis – HBV, HCV
- Cultivation of viruses
- Laboratory diagnosis of viral infections

**UNIT – 10 (5 Hrs)**

**Mycology:**

- Introduction to Mycology
- Classification of medically important fungi
- List of medically important fungi and diseases
- Laboratory diagnosis of fungal infections.

**Practical: (20 Hrs)**

a) Compound microscope (Demonstration)
b) Demonstration of sterilization equipments
c) Demonstration of culture media and culture methods
d) Demonstration of antibiotic sensitivity testing
e) Demonstration of serological tests
   - Widal
   - VDRL
   - ASO
   - CRP
   - RA

f) Demonstration of gram stain
g) Demonstration of ZN staining
h) Demonstration of Helminthic ova
i) Grams stain, Acid fast staining
j) Stool exam for Helminthic ova

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**SCHOOL OF ALLIED HEALTH SCIENCES**

# SYLLABUS FOR MASTERS

# IN PUBLIC HEALTH

2021-22 Onwards

# Syllabus and Contents

## Semester 1

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4102 | **Principles of Epidemiology** |

### Contents

**Introduction to epidemiology**

- Definition, importance, scope, and objectives of epidemiology

  Application of epidemiology

- Epidemiology and clinical practice

**History and evolution of epidemiology**

- Origin of epidemiology
- Epidemiologic approach
- Early pioneers of epidemiology

**Dynamics of disease and health**

- Concept of disease and health
- Natural history of disease.
- Modes of transmission
- Levels of prevention
- Epidemic, Endemic, Pandemic

- Immunity – active, passive and herd immunity

- **Measures of Morbidity and Mortality**

  - **Measures of Morbidity:**

- Incidence: cumulative incidence, incidence density.
- Prevalence: point prevalence, period prevalence
- Relationship of incidence and prevalence.
- Disease burden: Quality of life, survival rate, life table, YPLL, DALYs

  - **Measures of Mortality:**

- Mortality rates, Crude rate (Birth and death)
- Fertility rates, case fatality rates,
- Cause specific mortality rates,
- Proportion mortality rate,
- Infant mortality rates,
- Maternal mortality rates,
- Neonatal mortality rates
- other mortality rates

- **Comparing rates in epidemiology**
- Adjusted rates – PMR, SMR
- Measures of association,
- Relative risk, odds ratio
- Attributable risk, Population attributable risk.

**Association and Causation**

- Association,

- Types of association
- Casual association

  Types of causes
- Rothmans causal relationship/inference

**Bias, Confounding, Chance**

- Bias, types of bias, confounding, effect modification

**Screening of Disease**

- Screening
- Types of Screening
- Accuracy of Screening Tests,
- Validity,
- Reliability,
- Precision

**Public Health Surveillance**

- Surveillance and its types.

**Epidemiological studies**

- Observational studies
- Descriptive studies
- Case report, Case series
- Analytical studies
  a. Ecological studies
  b. Cross Sectional studies
  c. Case-Control studies

d. Cohort studies

e. Hybrid studies

- Experimental studies:

a. Randomized Control Trials

b. Community Trials

**Applications in epidemiology**

- Investigation of an outbreak
- Designing experimental studies
- Surveys

**Epidemiology and evaluation**

- Using epidemiology to evaluate health services.
- Epidemiologic approach to evaluate screening
- Epidemiology and public policy
- Ethical and professional issues in epidemiology

**Practicum**

- Tools in epidemiology (only practical)

  - Investigation of epidemic
  - Designing epidemiologic study
  - Survey and field visits

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4104 | **Social and Behavioral Health** |

## Contents

- **Introduction to social and behavioral health**
  - Health, illness, behavior
  - Health behavior, illness behavior, sick role behavior, health literacy
  - Risk factors
  - Determinants of health
  - Theory, concepts, constructs, variables.
  - Models
- Importance of studying social and behavioral factors in public health.
- Historical perspectives of population and disease. Changing the context of health and behavior

**Social epidemiology**

- Causality Continuum model
- Global diseases pattern –social factors
- social ecology of inequality
- Social Ecological Web

**Theoretical foundation:**

- Behavioral and social science theory
- Models for individual health behaviors.

- Health Belief Model
- Trans theoretical Model
- Theory of Planned Behavior
- Theory of Reasoned Action
- The Integrated Behavioral Model
- Precaution Adoption Process Model

- Models of interpersonal health behavior
  - Social cognitive theory
  - Social network and social support theory Community level models
  - Community organization and participatory model.
  - Diffusion of innovation theory
  - Theory of organizational change

**Social Environment and Socio-Cultural Context of Health**.

- Social environment and health
- Social reactions to disease.
- Comparative health cultures.
- Health disparities, diversity and cultural competencies.
- Urbanization, industrialization, modernization.
- Social control and deviance.

**Interventions, methods and practices**:

- Planning health promotion and disease prevention programs.
  - Program planning and intervention development: PRECEDE and PROCEDE model
  - Community health planning-MAPP

- Program evaluation

**Community based approaches to health promotion.**

- Community, Key features of community-based intervention
- Community assessment and community based participatory research approach
- Types of community-based approaches. DATCH
- Advantages and challenges of community-based interventions.
- Social marketing in public health
- Approaches to policy and advocacy.

**Anthropological understanding of public health problems**:

- Introduction to medical anthropology and application
- Medical pluralism: Traditional and alternative systems
- Health seeking behavior

**Health Promotion**

**Developing health promotion program**

- Overview of health promotion: Ottawa Charter and Jakarta declaration
- Needs assessment
- Program development and Program evaluation

**Practicum:**

Visit to NGOs working in specific areas to learn the applied aspects of social theories.

Designing programmes based on behavioral change etc.

Developing models for social pathology (Social problems – Stigma,

discrimination, caste, race, crime, slums, child abuse, beggary, prostitution, drug abuse, eating disorders, alcoholism's, substance abuse, human trafficking, poverty) and disease prevention and promotion.

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4105 | **Environmental and Occupational Health** |

**Contents**

- **Introduction of environmental health**
    - Basics of environmental health
    - Principles of environmental health
    - Significance of environment for human health
    - Climate
    - Ecosystem and Biomes
    - Energy flow, energy sources, consumption types.
    - Trophic levels.
    - Nutrients recycling (carbon, nitrogen and phosphorus)

**Environmental degradation**

- Decline of eco systems.
- Global climate change
- Loss of biodiversity and Impact on environment
- Deforestation
- Rain forests
- Soil degradations and Soil erosion
- Greenhouse effect, Greenhouse gases
- Role of chemicals and fertilizers on health

- Desertification
- Wetlands
- Green revolution
- Food security

**Water and waste water**

- Water and its properties
- Hydrological cycle
- Resource of water
- Water and health
- Water shortage and scarcities
- Water consumption and management

Water uses

- Sources of drinking water
- Water quality
- Water pollution
  - Types of pollution
- Sources of pollution

**Water treatment**

- Municipal water treatment
- Disinfection
- Home water treatment
- Surveillance of drinking water

**Waste water disposal and treatment**

- Sewage
- Biological Oxygen Demand and Chemical Oxygen Demand
- Types of disposal
- Pit privies, septic system, etc.

**Solid and hazardous waste**

- Definition and characteristics
- Types of municipal solid waste
- Collection, Management and Disposal of solid waste (landfill, composting, combustions/ incinerator etc.)
- Hazardous Wastes-Sources, Types. Collection Management and Disposal of hazardous waste
- Sanitation, drainage and excreta disposal at fairs/public gathering, rural and urban settings.

- **Air, Noise and radiation**

- Atmosphere and methods dispersion
- Chemical characteristics
- Physical characteristics
- Air pollution
- Pollutants
- Indoor and outdoor air pollution
- Prevention of air pollution
- Ventilation
- **Noise**

- Physics of sound
- Physiology of sound and health effects
- Noise pollution control and prevention

- **Radiation**
  - Ionizing radiation
  - Radio isotopes
  - Radiations exposure
  - Types of radiation
  - Health effects
  - Prevention
- **Light, Healthy building and housing**
- **Risk assessment**
  - Environmental risk characteristics.
  - Development of risk analysis.
  - Tools of risk analysis.
  - Process of risk analysis.
- Risk management and communication

**Occupational Health**

**Fundamentals of Occupational health and work safety**

- Meaning and Scope
- Basic principles, application of Occupational Health and Safety at the workplace
- Promotion of healthy and safe workplaces,
- Protection of workers' health and wellbeing and early diagnosis of work-related disorders and diseases.

- Basic concepts in screening of occupational disease

**Occupations hazards and Diseases**

- Occupational Lung Diseases (pneumoconiosis, asbestosis, silicosis and coal worker's pneumoconiosis); asthma, hypersensitivity pneumonitis, byssinosis and inhalation fevers.)
- **Occupational Cancers**
- Basic concepts of carcinogenesis, major occupational cancers.

**Metals in the Workplace**

- Exposure and toxicity from major metals in workplace.
- Idiopathic environmental intolerance and other subjective syndromes.

**Hazardous Materials and Chemical Emergencies**

- Exposure to hazardous materials and acute health effects from exposures.
- Chemical emergencies at workplace.
- Emergency measures and first aid.

**Cardiovascular Diseases and Workplace Health and Productivity**

**Occupational Dermatology and Shift Work and Sleep Disorders** and Work

- Occupational noise exposure and hearing loss.
- Exposure to hazards and health effects from extremes of temperature, pressure, vibration, radiation, etc.

**Musculoskeletal Disorders**

- Low back pain, neck pain, cumulative trauma disorders, rotator cuff disorders, epicondylitis, carpal tunnel syndrome.

**Practicum**

- Visit to Sewage treatment plant, Visit
- Municipal Solid Waste

Management Plant
- Visit to Biomedical waste treatment Plant
- Visit to Fair /Mela/festivals, Industry

## SEMESTER II

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4201 | **Health Systems Management and Program Planning** |

**Contents**

- Introduction to health systems Challenges in public health system Evolution of public health system public health care system – India
  - Primary health institutions (Primary health centre, sub centers, district hospitals), ASHA, VHSNC, ARS
  - Secondary health institutions
  - Tertiary health institutions and teaching hospitals
  - State and central government hospitals
  - Employee State Insurance
  - AYUSH
  - COMM unitization of health care Private health care system
  - Private hospitals, polyclinics
  - Nursing homes, dispensaries
  - Private practitioners (qualified, traditional

Health practitioners and non-qualified care providers)

  - Multispecialty hospital and medical college hospitals
  - Hospitals run by NGO and Voluntary organizations
  - Voluntary health agencies and not for profit agencies

Central and state health agencies and organizational structures

  - Planning at Central, State, District, Block and Village
  - Union Ministry of Health and Family Welfare,
  - Directorate General of Health Services, Central Council of Health,
  - State Ministry of Health, State Health Directorate,
  - District Health Organization etc.

Comparison of health systems of various other countries

  - United states of America
  - United Kingdom

- Canada
- Germany
- Russia
- Japan
- Africa
- Thailand
- Cuba

Introduction to health care and program planning

Principles of Management

Strategic management, Logistics management, Human resources management

concept of Planning,

Planning process, structure, and functions of planning o

Planning cycle, project management cycle

- Management analysis
- Political aspect, economic aspects,
- Epidemiological base for health planning
- Planning tools- log frame, PERT, CPM
- Health Planning Models

Health promotional planning

health facilities Community

involvement Organization

structure and process

Monitoring and evaluation

Quality assurance in project management

Health planning in India, five years plans, district health plans, micro plans, planning at the level of PHC.

National Health Programs

Healthcare Legislation in

India:

- Legal aspects of healthcare,
- The Medical Termination of Pregnancy Act,
- the maternity benefit act,
- the immoral traffic(prevention) act,
- the transplantation of human organs act,
- PNDT Act,
- the registration of birth and Death act,

The child labor (prohibition and regulation) act,

- Biomedical waste Rules,
- COPRA Act,
- Domestic violence

- Indian factories act,
- ESI act

## PRACTICUM

Visit to village for family health study Visit to understand Health system functioning Rural – i) Government ii) Private iii) Others Urban- i) Government ii) Private iii) Others
Visit to understand other systems of Health e.g. Railway, Military Grant writing/proposal writing

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4202 | **Global Health and Diseases of Public Health Importance** |

**Contents**

**Introduction to Global Health and Development**

- Global health –Origin of modern international health
- Overview of Global burden of disease
- Comparison and trends of disease burden
- Urbanization, Globalization, and Migration
- international key institutions – bilateral and multilateral

- Global Public Private Partnership
- social determinants of health and social inequalities in health.

  MDG's. and SDG
- Development assistance for health.
- Priorities for the global research and development of interventions.
- international travel and health advice
- international health regulations.

**Introduction to infectious diseases:**

- Host pathogen interaction
- Classification of diseases
- Sources of infection
- Disease transmission
- Laboratory diagnosis of infectious diseases
- Disinfection and sterilization
- Molecular mechanism of microbial pathogenesis
- Host defense mechanism
- Immunity, immunization and types
- Vaccines and cold chain

**Epidemiology of infectious diseases:**

- Respiratory infections (Small pox, chicken pox, measles, rubella, mumps, influenza, diphtheria, whooping cough, meningococcal meningitis, acute respiratory infections, SARS, Tuberculosis.)
- Intestinal infections (Poliomyelitis, viral hepatitis, acute diarrheal diseases, Cholera, typhoid fever, food poisoning, amoebiasis, ascariasis, hookworm infection)
- Arthropod-borne infections (Dengue, malaria, filariasis,)
- Zoonoses (Rabies, yellow fever, Japanese,) fever, leptospirosis, plague, salmonellosis
- Rickettsia diseases

Parasitic zoonosis- (hydatid diseases, scabies, pediculosis, leishmaniasis)

- Nosocomial infections
- Sexually transmitted diseases
- Toxins: Botulism, tetanus

**Epidemiology of chronic and lifestyle diseases:**

Cardiovascular diseases

Hypertension and ischemic heart diseases

Stroke

Cancers (Breast, Cervical, Lung, Oral, Prostate,

Skin) Diabetes

Obesity

Blindness

Accidents and injuries

Mental health

Arthritis,

osteoporosis

Alzheimer's

diseases

Parkinson's

diseases

Suicides

Dental caries

**Practicum**

- Visit to infectious disease hospitals
- Outbreak investigation
- Survey of Non-Communicable Diseases

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4203 | **Research Methodology and Ethics in Public Health Practice** |

**Contents**

- Concept of health system
- Meaning, characteristics and guidelines for conducting health systems research
- Types of Research in Public health management- descriptive, ecological, epidemiological, action and experimental research
- Role and methods of Review of literature as a tool for planning research Role of theory, Cause and effect phenomenon in research and formulation of hypothesis in research
- Quantitative, Qualitative and Ethnographic research methods and their application in public health
- Steps in Planning of Research studies in general
- Different types of surveys and their planning
- Planning and conducting participatory action research in public health management
- Research designs in clinical research and intervention studies Assessment of Performance indicators in public health management
- Scope of Operation Research in Public health management

- Introduction to Important Operation Research methods-
  - Systems analysis

- Linear programming technique
- Network analysis
- Queuing theory

**Ethics:**

- Ethics in research
- Conflict of interest and integrity in research
- Ethical issues in public health programmes.

**Practicum**

- Planning and developing research projects
- Data collection
- Analysis of data
- Designing research programmes

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4204 | **Public Health Informatics** |

**Contents**

- **Introduction to Public Health Informatics**
    - What is public health informatics?
    - Principles of public health informatics
    - Components of public health informatics
    - Health informatics
    - Data, Information, Knowledge and Wisdom
    - Importance of data
    - e-Health and m-health
- **Fundaments of computers**
    - Basics of computer and its elements
        - Computers for individual use and for organizations.
        - Memory devices, input devices, output devices, CPU, hardware, software's (system software and application software's)
        - Storage devices
        - Computer networking, telecommunication , including internet and cloud computing
        - Data base management system-Database, types of databases, data warehousing and data mining (creating data base tables, viewing records, sorting records, querying database tables, generating reports)
        - SQL.

- **Information System:**
    - Information system and types of information systems
    - Information system, organization and strategy
    - Design, building information system, planning and development.
- **Public Health Informatics**
    - Information architecture

    Core competencies in public health informatics

    - Assessing the value of information system and software development
    - Managing IT personal and projects.
    - public health informatics and organizational change
    - Privacy, confidentiality and security of public health information
    - Data standards in public health informatics
    - Evolution of public health informatics
    - Risk factors and risk mitigations in information system
    - **Application of public health information system**
        - the national vital statistic system
    - Risk factor information system

      Knowledge based information and system
    - Immunization registries
    - Geographic information system
    - Tele health and telemedicine
    - electronic health records

- electronic population registries
- m- health and use of mobile technology
- public health information ethics.

**Practicum**

- Window and GUI.
- MS Word- full working and practice
- MS Excel- how to operate, developing a work sheet, simple calculations
- MS power Point- how to make a presentation
- Use of internet- access, e-mail, search engine and health related websites, how to search for literature
- Evaluating and organizational impact of health care

information systems by James G Anderson, Carolyn Asotin

- Developing Health Management Information Systems: A practical guidelines for developing countries.
- Introduction to computers by Peter Norton, Tata McGraw-Hill
- Data base management systems by Raghu Ramakrishnan and Johannes Gehkke.

| COURSE CODE | COURSE TITLE |
|---|---|
| 21MPH4205 | **Population Health (Maternal, Child Health and Family Welfare)** |

**Contents**

- **Demography**

O. Definition, nature, scope, and importance of demography

O. Development of demographic research developing countries such as India

o. Sources of data- census, vital statistics, NSSO, NFHS

o. Rates and ratios, Midyear population, measures of fertility, morbidity and mortality.

Population theories

- Demographic transition

- **Population growth**
- World population growth- regional distribution (India, China, US, Germany, France, Japan, Nigeria, Kenya, Bangladesh, Singapore, UAE)
- Population growth and distribution in India and its states.
- Population structure and characteristics
- Age, sex distribution in India and selected countries.

- Marital status- age at marriage and public health

  concerns

- Sex ratio in India and selected countries
- Sex ratio trends observed in different states, causes and consequences
- **Reproductive Health:**
- Menarche, menopause and associated problems and management
- Fertility, fecundity, sterility, primary and secondary, abortion, natural fertility – biological limits, social determinants, physiological factors, role of social and cultural factors of fertility, still births levels trends, breast feeding.
- Informed decisions making on reproductive issues
- Differences in fertility with respect to selected countries.
- Population policy India and China and Global over view
- Family planning Programme: critical review of selected

  countries family planning Programme and its achievements

- Methods of birth control
- **Women's Health:**
  - Evolution of MCH services
  - Reproductive pattern and its effect or maternal and child health.
  - Measures of reproductive pattern
  - Age at marriage, Maternal age, Number of children born (Parity, gravidity and birth order)
  - Birth interval –pregnancy, delivery and spacing.
- **Measures of Health- Mortality**
- Maternal Mortality Rate/Ratios
- Infant and Child Morality

- Fetal Loss
- Trends of maternal, infant and child mortality in selected countries.

- **Measures of Morbidity**
  - Maternal complication or illness of pregnancy/delivery
    - Maternal Nutrition and health
    - Infant birth weight/Prematurity
    - Birth defects

      Infants/Child Nutrition/ Infections
- **Growth and Development** Height/

  Weight, Body mass index

  Intelligent Quotient (IQ)
- **Interpersonal and Social dimensions of women's health**
- Substance abuse, violence,

  harassment Women in work place

- **Programme interventions to improve Maternal and Child Health like:**
  - Introduction to the RMNCH+A services – historical context, evolution, coverage and innovations
  - Various components of service delivery under RMNCH+A (including GoI programs)
  - Maternal, New-born and Child Health (MNCH) services in

    the country Adolescent health
  - Role of gender in public health programs
  - Evolution of RCH services in the country – Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs)

- Innovations in service delivery Framework for evaluation of services

- Integrated child development Services (ICDS)-Organizational structures,

  Outreach,

  Critical

  assessment,

  Impact

- **School Health Programme- Critical Review, objectives and Components.**
  Child labor,

  Child schooling and impact on health

  Childhood Disabilities- Problems, types, Causes, Preventive measures, Sources of data, community Rehabilitation.

- **Family Welfare Programme:** Historical View from birth control to family welfare, clinical Approach, Cafeteria Approach, Target based Approach, Target free approach, Organizational Structure, Eligible couple Survey. Key Personnel Involved, ANM, National, state level Evaluations, Source of Data for the Programme, demographic goals, All India Hospital Post-Partum Programme, Administration of Programme

**Practicum**

- Visit to maternity homes, PHCs
- Visit to NGOs working on women's issues