

DHANALAKSHMI SRINIVASAN UNIVERSITY
SAMAYAPURAM - 621112



SYLLABUS FOR BACHELOR OF SCIENCE IN CRITICAL CARE TECHNOLOGY

HEALTH FOR ALL

CRITICAL CARE TECHNOLOGY

I YEAR

S.NO	NAME OF THE SUBJECTS	TOTAL HOURS ALLOTTED
1.	ANATOMY +APPLIED ANATOMY + BIOCHEMISTRY (ANATOMY 75% + BIOCHEMISTRY 25%)	105 HOURS
2.	PHYSIOLOGY + BASIC PHYSICS (PHYSIOLOGY 75% + PHYSICS 25%)	90 HOURS
3.	COMPUTERS + ENGLISH (COMPUTER 50% + ENGLISH 50%)	60 HOURS
4.	CLINICAL	1000 HOURS

II YEAR

S.NO.	NAME OF THE SUBJECTS	TOTAL HOURS ALLOTTED
1.	ANATOMY + APPLIED ANATOMY & PHYSIOLOGY	90 HOURS
2.	CLINICAL MICROBIOLOGY	30 HOURS
3.	ICU MONITORING I (BASIC) & BIOMEDICAL ENGINEERING (ICU MONITORING 75% + BIOMEDICAL ENGINEERING 25%)	90 HOURS
4.	PATHOLOGY, PATHOPHYSIOLOGY & PHARMACOLOGY (PATHOLOGY 50% + PHARMACOLOGY 50%)	90 HOURS
6.	CLINICAL	1000 HOURS

III YEAR SUBJECT

S.NO	NAME OF THE SUBJECTS	TOTAL HOURSALLOTTED
1.	ICU MONITORING II +MAINTENANCE OF EQUIPMENT (ICU MONITORING 75% + MAINTENANCE 25%)	100 HOURS
2	ICU THERAPY	100 HOURS
3.	ICU ADMINISTRATION +LOGISTICS + STATISTICS+MEDICAL ETHICS	100 HOURS
4.	CLINICAL	1000 HOURS

YEAR - I

ENGLISH

COURSE DESCRIPTION

The course is designed to enable students to enhance ability to comprehend spoken and written English (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written English during clinical and classroom experience.

OBJECTIVES

At the end of the course, the student will develop

1. Ability to speak and write grammatically correct English.
2. Effective skill in reading and understanding the English language.
3. Skill in reporting and documenting

COURSE CONTENT

1. COMMUNICATION

- Role
- Definition
- Communication
- Classification of communication
- Purpose
- Major difficulties
- Barriers
- Characteristics – The seven Cs
- Communication at the work place
- Human needs and communication “Mind mapping”
- Information communication

2. COMPREHENSION PASSAGE

- Reading purposefully
- Understanding what is read
- Drawing conclusion
- Finding and analysis

3. EXPLAINING

- How to explain clearly
- Defining and giving reasons
- Explaining differences
- Explaining procedures
- Giving directions

4. WRITING BUSINESS LETTERS

- How to construct correctly
- Formal language
- Address
- Salutation
- Body and Conclusion

5. REPORT WRITING

- Reporting an accident
- Reporting what happened at a session
- Reporting what happened at a meeting

PRACTICUM

- The clinical experience in the wards and bed side nursing will provide opportunity for students to fulfill the objectives of learning language.
- Assignment on writing and conversation through participation in discussion debates seminars and symposia. The students will gain further skills in task oriented communication.

METHODS OF TEACHING

1. Lecture
2. Pair and Group work
3. Role plays
4. Oral presentations
5. Decoding & production of grammar exercise
6. Comprehension exercise
7. Writing assignments

8. Word puzzles & Quizzes
9. Communicative games & fluency activities

METHODS OF EVALUATION

1. Individual oral presentations
2. Group discussion
3. Answering questions from the prescribed English text.
4. Summary / Essay / Letter writing
5. Grammar exercises
6. Medical / General vocabulary exercises

WEIGHTAGE OF MARKS

Theory: Paper 3 in Year 1 combined with computer science Theory:

English-50 + Computer Science-50 (Total 100 marks)

No Practicals for English

Internal Assessment for Paper 3 in Year 1:

English-25 + Computer Science-25 (Total 50 marks)

Internal assessment For English

Term test	15 marks
Assignment	10 marks

Reference Books

1. Selva Rose. 1997, Career English for Nurses. Published by: OrientBlackswan Ltd
2. Oxford advanced Learners Dictionary, 1996
3. Quirk Randolph and Greenbaum Sidney, 1987. A University Grammar of English, Hong Kong: Longman group (FE) Ltd/ Pearson.
4. Thomson A.J. and Maituiet A.V. 1987, A Practical English Grammar, Delhi: Oxford University Press.
5. Gimson A.C.1989, An Introduction to pronunciation of English. Hodder Arnold; 4th Revised edition (1 May 1989).
6. O'Connor J.D, 1986. Better English pronunciation. Cambridge: University Press
7. By water F.V.A. 1982, Proficiency Course in English. London: 1-lodder and Strongliton.
8. Roget S.P. 1960, Thesaurus of English Words & Phrases, London: Lowe & Brydone Ltd. 196

YEAR – I

INTRODUCTION TO COMPUTERS

COURSE DESCRIPTION

This course is designed for students to develop basic understanding of uses of computer and its application in Critical Care Technology [CCT]

OBJECTIVES

At the end of the course, the student will

1. Identify & define various concepts used in computer. Identify application of computer in CCT.
2. Describe and use the Disk Operating System.
3. Demonstrate skill in the use of MS Excel and MS Power point
4. Demonstrate use of internet and Email

COURSE CONTENT

1. INTRODUCTION TO COMPUTER

- I/O devices – memories
- RAM and ROM-- - Different kinds –Kilobytes.
- Smart phones ,Tablets
- Basic commands – MD,CD,DIR,TYPE and COPY CON Commands
- Networking – LAN,WAN,MAN (only basic ideas)

2. TYPING TEXT IN MS WORD

- Manipulating text
- Formatting text - using different font sizes, bold, italics
- Bullets and numbering
- Pictures, file insertion
- Aligning the text and justify
- Choosing paper size - Adjusting margins
- Header and footer, Inserting page No s in a document
- Printing a file with options
- Using spell check and grammar
- Find and replace

- Mail merge
- Inserting tables in a document.

3. CREATING TABLE IN MS EXCEL

- Cell editing-Using formulas and functions
- Manipulating data with excel
- Using sort function to sort numbers and alphabets
- Drawing graphs and charts using data in Excel- Auto formatting – Inserting data from other worksheets.

4. PREPARING NEW SLIDES USING MS- POWER POINT

- Inserting slides – Slide transition and animation – Using templates
- Different text and font sizes –Slides with sounds – Inserting clips arts, pictures, tables and graphs- Presenting using wizards.

5. INTRODUCTION TO INTERNET

- Using search engine – Google search – Exploring the next using Internet Explorer and Navigator and Download of files and images
- E-mail ID creation –Sending messages- Attaching files – Introduction to “C” language –Different variables, declaration usage – writing small programs - using functions and sub-functions.

PRACTICAL

- Typing a text and aligning the text with different format using MS – Word
- Inserting a table with proper alignment and using MS-Word
- Create mail merge document using MS-Word to prepare greetings for 10 friends
- Preparing a Slide show with transition, animation and sound effect using MS-Power point
- Customizing the slide show and inserting pictures and tables inthe slides using MS-Power Point
- Creating a worksheet using MS-Excel with data and use of functions
- Using MS-Excel prepare a worksheet with text, date time and data
- Preparing a chart and pie diagrams using MS-Excel

- Using Internet for searching, uploading files, downloading files and creating e-mail ID
- Using C language writing programs using functions
- Using Hospital IT services

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments

Candidate should create new table, enter sample data and apply basic excel calculation formula.

4. Oral Presentations

WEIGHTAGE OF MARKS

- Candidate should create a new document Type the matter align & format.

Theory: Paper 3 in Year 1 combined with computer science Theory:

Computer Science-50 + English-50 (Total 100 marks)

Practicals in Computers – 50 marks

Internal Assessment for Paper 3 in Year 1:

Computer Science-25 + English-25 (Total 50 marks)

Internal assessment For Computers

Term test	15 marks
Assignment	10 marks

Reference Books

1. Fundamentals of computers- V. Rajaraman-2004
2. Absolute beginners guide to computer basics-Michael Miller. Que Publisher, September 1, 2009.
3. Networking concepts and technology – by Deepak Kalkadia, Francesco DiMambro, Prentice hall publisher, May 25, 2007
4. Operation system concepts (8th edition) by Abraham Silberschatz, Peter Baer Galvin, Greg Gangne, Wiley Publisher, Feb 13, 2009.
5. Microsoft office 2013 for Dummies – by Wallace Wang, July 31, 2013.

YEAR - I

ANATOMY

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of the normal structure of human body and its functions. To ensure that the students understand the alteration in anatomical structure and function in disease in the practice of critical care technology

OBJECTIVES

At the end of the course, the student will be able to

1. Describe and identify the the anatomical terms, organization of human body and structure of cell, tissue, membranes and glands.
2. Describe the structure and functions of bones and joints.
3. Describe the structure and functions of systems in body.

COURSE CONTENT

Block I: Introduction to human anatomy

Unit 1: Basic Anatomical Terminology, planes, body positions, relations

Unit 2: Human Cell Structure

Unit 3: Tissue – definition, types, characteristics,
classification, location, functions & formation

Unit 4: Membranes and glands – classification and structure

Block II: Musculoskeletal system

Unit 1: Upper Limb: Clavicle, Scapula, Humerus, Radius, Ulna, Hand

Unit 2: Muscles, blood supply, nerve supply of upper limb & lower limb

Unit 3: Lower Limb: Femur, pelvis, Sacrum, Tibia, Fibula, and
Vertebral column

Unit 4: Muscles, blood supply, nerve supply of upper limb and lower limb.

Block III: Respiratory System

Unit 1: Thoracic cage anatomy

Section 1: Thoracic cage, ribs, sternum, thoracic vertebrae Section 2:

Diaphragm, intercostal muscles, muscles of the back Section 3: Pleura

Section 4: Blood supply, nerve supply, lymphatics

Unit 2: Upper respiratory anatomy

Section 1: Nose, nasopharynx, Oral cavity, oropharynx

Section 2: Pharynx, larynx

Section 3: Blood and nerve supply of Nose/Larynx

Unit 3: Lower respiratory anatomy

Section 1: Trachea to bronchial tree

Section 2: Lungs with broncho-pulmonary segments and
surface anatomy

Section 3: Bronchial circulation, nerve supply

Block IV: Cardiovascular System

Unit 1: Heart and valves, pericardium, endocardium, myocardium,
surface anatomy

Unit 2: Major vessels of circulatory system: Aorta, Pulmonary
vessels, IV and major branches

Unit 3: Coronary circulation

Block V: Central Nervous System

Unit 1: Organization of the CNS

Section 1: Central nervous system: Brain and spinal cord

Section 2: Peripheral nervous system

Section 3: Autonomic nervous system

- Sympathetic system,
- Parasympathetic system
- CSF – Synthesis, circulation

Unit 2: Cerebral circulation

- Circle of Willis
- Blood supply of the spinal cord/CSF

Unit 3: Pain pathway

Block VI: Excretory System

Unit 1: Kidney, ureter, bladder

Unit 2: Blood supply and innervation

Block VII: Abdomen

Unit 1: Liver, pancreas, small & large Intestine liverUnit

2: Adrenals

Block VIII : Endocrine Glands

PRACTICALS IN ANATOMY

- I. Osteology
- II. Surface anatomy
- III. Radiology

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Paper 1 in Year 1 combined with biochemistry

Theory: Anatomy - 75 marks + Biochemistry - 25 marks (Total 100 marks)

Practicals

Anatomy – 35 marks + Biochemistry – 15 marks (Total 50 marks)

Internal Assessment for Paper 1 in Year 1:

Anatomy – 35 marks + Biochemistry – 15 marks (Total 50 marks)

Internal assessment For Anatomy

Term test 20 marks

Assignment 15 marks

Reference 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)

YEAR – I
BIOCHEMISTRY

**COURSE
DESCRIPTION**

The course is designed to assist students to acquire the knowledge of the normal biochemical functioning of human body and alterations.

OBJECTIVES

At the end of the course, the student will be able to

1. Identify the basic principles of biochemistry.
2. Synthesize the knowledge of these principles in various situations.

COURSE CONTENT

Block 1: Carbohydrates

Unit 1: Glucose & Glycogen metabolism

Block 2: Proteins

Unit 1: Classification of Proteins and functions

Block 3: Lipids

Unit 1: Classification of Lipids and functions

Block 4: Enzymes

Unit 1: Definition, Nomenclature, and Classification

Unit 2: Factors affecting enzymes activity

Unit 3: Active site, Co-enzyme, enzymes inhibition, units of enzymes, iso enzymes, Enzyme pattern in disease

Block 5: Vitamins & Minerals

Unit 1: Fats soluble vitamins (A, D, E, K)

Unit 2: Water soluble vitamins (B complex vitamin)

Unit 3: Principle elements (Calcium, Phosphorus, Magnesium, Sodium, Potassium)

Unit 4: Trace elements:

- Calorific value of foods
- Basal metabolic rate(BMR)

- Respiratory quotient (RQ)
- Specific dynamic action (SDA)
- Balanced diet

Unit 5: Nutrition Marasmus, Kwashiorkor

Section 1: Assessment of nutrition requirements & Basic nutritional plan

Section 2: Normal requirements of calories, proteins, fluid, electrolytes

Section 3: Fluid balance and electrolytes

Block 6: Acids Base balance

Unit 1: Definition, P_H values, Henderson – Hasselbach equation, Buffers

Unit 2: Indicators, Normality, Molarity, and Molality

PRACTICALS

- Benedict's test
- Heat coagulation tests
- Normal values of Biochemical parameters

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Paper 1 in Year 1 combined with anatomy

Theory: Anatomy - 75 marks + Biochemistry - 25 marks (Total 100 marks)

Practicals

Anatomy – 35 marks + Biochemistry – 15 marks (Total 50 marks)

Internal Assessment for Paper 1 in Year 1:

Anatomy – 35 marks + Biochemistry – 15 marks (Total 50 marks)

Internal assessment for Biochemistry

Term test

Assignment

10 marks

5 markseference Books

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

YEAR - I

PHYSIOLOGY & BASIC PHYSICS

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of the normal physiology of various human body systems and understand the alternation in physiology in disease and practice of critical care technology

OBJECTIVES

At the end of the course, the student will be able to:

1. Describe the physiology of cell, tissues, membranes and glands.
2. Describe the physiology of blood and functions of heart.
3. Demonstrate blood cell count, coagulation, grouping, Hb; BP and Pulse monitoring
4. Describe the physiology and mechanism of respiration.
5. Demonstrate spirometry
6. Describe the physiology of Excretory system

COURSE CONTENT

Block 1: The Cell

Unit 1: Cell structure and functions of the various organelles, Endocytosis and exocytosis

Unit 2: Acid base balance and disturbances of acid base balances (alkalosis, acidosis)

Block 2: Cardiovascular system

Unit 1: Physiology of heart

Unit 2: Heart sounds, auscultatory areas

Unit 3: Cardiac cycle, cardiac output and factors affecting cardiac output, stroke volume, contractility, preload, after load

Unit 4: O₂ delivery, uptake to tissues

Unit 5: Cardiac conduction system, Regulation of rate, basic arrhythmias

Unit 6: Arterial pressure, Blood pressure, Hypertension, hypotension

Section 1: Blood pressure

- Maintenance of normal BP and factors affecting it

- Systolic, diastolic, pulse pressure, mean arterial pressure
- pressure

Unit 7: Electrocardiogram

Section 1: Principles of ECG, Normal ECG/Abnormal ECG
Common cardiac Problems – MI, -VPC, Ischemia - VT, VF

Block 3: Blood

Unit 1: Homeostasis

Unit 2: Composition of blood, functions of blood and plasma proteins, classification of protein.

Unit 3: Pathological and Physiological variation of the RBC, WBC's, platelets

Unit 4: Functions of haemoglobin

Unit 5: Erythrocyte sedimentation rate

Unit 6: Detailed description about WBC, TC, DC & functions

Unit 7: Platelets: Formation, normal level and functions

Unit 8: Blood group and Rh factor

Block 4: Respiratory system

Unit 1: Physiology of breathing

Section 1: Regulation of breathing

Section 2: Respiratory movements

Section 3: Mechanics of breathing, muscle action

- Pressure, volume
- Resistance, compliance

Section 4: Definition and normal values of lung volumes and lung capacities, Lung volumes & capacity

Unit 2: Gas exchange & transport - oxygen, CO₂

Section 1: Diffusion, Gas exchange, mechanism of diffusion

Section 2: O₂ transport & abnormalities, Factors affecting O₂ transport

Section 3: CO₂ transport & abnormalities

Unit 3: Work of breathing, pulmonary function tests

Unit 4: Acid base balance, ABG

Block 5: Central Nervous system

Unit 1: Function of CSF, Intracranial pressure

Unit 2: Metabolic requirements of the brain, Cerebral autoregulation

Unit 3: Consciousness

Unit 4: Basic function of the eyes: light reflex, movementsUnit

5: Cough and gag reflex

Block 6: Digestive system

Unit 1: Physiological and anatomy of the GIT

Unit 2: Food digestion in the mouth, stomach and intestineUnit 3:

Absorption of foods

Unit 4: Role of bile in the digestion

Block 7: Excretory system

Unit 1: Normal urinary output, Micturition

Unit 2: Renal function tests, Renal disorders

Block 8: Endocrine system

Unit 1: Function of pituitary

Unit 2: Thyroid

Unit 3: Parathyroid

Unit 4: Adrenal /Pancreatic

}
} Hormones
}

Block 9: Reproductive system

Unit 1: Formation of semen & spermatogenesis

Unit 2: Brief account of menstrual cycle

PRACTICALS

- Microscope
- Pulse oximetry Tracing , E7Co2 -Tracing
- Blood group
- Measurement of BP, Auscultation, Heart sounds
- Measurement of PR, HR &RR
- Examination of the eye / pupil
- Cough and gag reflex
- Examination of respiratory system

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Paper 2 in Year 1 combined with basic physics

Theory: Physiology - 75 marks + Physics - 25 marks (Total 100 marks)

Practicals - Physiology – 50 marks

Internal Assessment for Paper 2 in Year 1:

Physiology – 35 marks + Physics – 15 marks (Total 50 marks)

Internal assessment for Physiology

Term test 20 marks

Assignment 15 marks

Reference 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. Venkatesh D: Basics of Medical Physiology for Nursing, LWW (2009).
5. Hall J: Guyton Textbook of Medical Physiology. Elsevier (2012).
6. Tandon: Best & Taylor's Physiologic Basis of Medical Practice (2011).

YEAR - I

BASIC PHYSICS

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of basic physics in the practice of critical care technology

OBJECTIVES

At the end of the course, the student will be able to

1. Describe the properties that characterize the three states of matter.
2. Describe the gas behavior in changing conditions.
3. Describe the principles that govern the fluid dynamics.
4. Describe the basics concept of pressure, volume, thermodynamics and humidity.

COURSE CONTENT

Block 1: Basic physics

Unit 1: States of matter

Unit 2: Changes of state

Unit 3: Gas behavior under changing conditions

Gas laws: Boyles / Charles / Gay Lussais, Daltons laws & application

Unit 4: Fluid dynamics

Concepts of pressure, volume, flow, Temperature,

Humidity Measurements – units & devices

Introduction to Medical term describing normal & abnormal process

Block 2: Medical Gases:

Unit 1: Characteristics of Medical gases

Unit 2: Storage of medical gases

Section 1: Cylinders, Liquid gas storage, oxygen concentrator

Unit 3: Distribution of regulation of medical gases

Section 1: Piped distribution system

WEIGHTAGE OF MARKS

Theory: Paper 2 in Year 1 combined with physiology

Theory: Physiology - 75 marks + Physics - 25 marks (Total 100 marks)

Practicals

No practical in physics

Internal Assessment for Paper 2 in Year 1:

Physiology – 35 marks + Physics – 15 marks (Total 50 marks)

Internal assessment for Physics

Term test 10 marks

Assignment 5 marks

PRACTICALS – NO PRACTICALS

Reference Books

1. Davis P: Basic Physics and Measurement Anesthesia.
2. Thayalan K: Bio Medical Physics for Nurses.
3. Kacmarek R. M: Egan’s Fundamentals of Respiratory Care. Elsevier(2013)

YEAR II

APPLIED ANATOMY & PHYSIOLOGY

COURSE DESCRIPTION

This course is designed to assist students in developing an in depth knowledge in the field of applied anatomy and physiology.

OBJECTIVES

At the end of the course the students will be able to acquire knowledge and develop proficiency in the anatomical and physiological aspects of patients with medical and surgical disorders in various health care settings.

COURSE CONTENT

Block 1: Applied Anatomy Related To Critical Care

Unit 1: Introduction to anatomy

Section 1: Anatomical terms, planes, and relations etc.

Unit 2: Respiratory system

Section 1: Anatomy of thoracic cage bones-

- Ribs, spine,
- Diaphragm, intercostal muscles,
- Blood supply and nerve supply

- Nose, nasopharynx
- Oral cavity, tongue, oropharynx
- Laryngopharynx
- Blood and nerve supply
- Lungs with bronchopulmonary segments
- Pleura
- Blood and nerve supply

Unit 3: Cardiovascular System

Section 1: Heart, Pericardium, Myocardium, endocardium, valves

Section 2: Major vessels of circulatory system –

- Aorta
- IVC
- Pulmonary vessels and all major

branches Section 3: Coronary circulation

Unit 4: Central Nervous System

Section 1: Basic organization of the nervous system

- Central –Brain, Spinal cord
- Peripheral
- Autonomic nervous system
 - Sympathetic nervous system
 - Parasympathetic nervous

system Section 2: Cerebral circulation

- Circle of Willis
- Blood supply of spinal cord

Section 3: Pain pathway

Unit 5: Excretory System

Section 1: Kidney, Ureter, and Bladder, Blood, nerve supply

Unit 6: Abdomen

Section 1: Liver, pancreas, islet cells Section 2:

Thyroid, parathyroid, adrenals.

Block II: Applied Physiology

Unit 1: Respiratory System

Section 1: Homeostasis

Section 2: Physiology of Breathing

- Regulation of respiration
- Respiratory movements
- Chest wall mechanics- pressure, volumes, resistance, compliance
- Lung volume and capacities
- Work of breathing
- Oxygen transport
- Carbon di oxide transport
- Factors affecting oxygen transport
- Mechanism of hypoxia
- V/Q mismatch.
- Indications For Artificial Airways
 - Relieving airway obstruction
 - Secretion removal

- Protecting the airway
- Positive pressure
- Ventilation
- Selecting & Establishing An Artificial Airway
 - Nasal airways
 - Pharyngeal airways
 - Tracheal airways
- Airway Clearance Techniques
 - Airway suctioning
 - Bronchoscopy
- Airway Maintenance
 - Securing the airway & confirming placement
 - Providing adequate humidification
 - Minimizing nosocomial infections
 - Providing cuff care
 - Facilitating clearance of secretion
 - Trouble shooting airway emergencies
- Extubation
 - Indication
 - Procedure
 - Post extubation – care and complication

Section 6: Oxygen Therapy

- Sources of Oxygen for therapy
- Storage of Oxygen
- Oxygen delivery system
- Hazards of Oxygen

Section 7: Chest X-Ray

- Normal Chest X-Ray
 - Normal anatomy
 - Basic physics of X –ray and assessment of film quality
 - Cardiac configuration
 - Lung fields and airway

- Optimum position of –Endotracheal tubes, Nasogastric tubes, Central lines
- Abnormal Chest X-Ray
 - Trauma
 - PneumothoraxHemothorax
 - Lung contusion
 - Pulmonary edema
 - ARDS
 - Pneumonia
 - Broncho pneumonia
 - Lobarpneumonia
 - Aspiration pneumonia

Unit 2: Cardiovascular System

Section 1: Cardiac cycle

- Cardiac output - Factors affecting cardiac output
- Preload, afterload, stroke volume, contractility
- Cardiac conduction system - Regulation of rate, basic arrhythmias
- Principles of ECG, Normal ECG

Section 2: O₂ delivery, uptake in tissues

Section 3: Blood pressure

- Maintenance of normal BP and factors affecting it
- Systolic, diastolic, pulse pressure, mean arterial pressure

Unit 3: Central Nervous System

Section 1: Cerebral auto regulation, cerebral oxygen consumption, Coma

Section 2: Cerebrospinal fluid, intracranial pressure

Section 3: Cranial nerves

- III, IV, VI
- IX, X, Cough reflex, gag reflex

- Pupils: accommodation reflex, light reflex

Section 4: Sedation and analgesia

Section 5: Brain death

PRACTICAL:

- Clinical Evaluation
- Case Study/ Case Book
- Practical Record
- Observational/ Field Visit
- Each student should be given planned healthcare teaching by conducting clinical teachings and case presentations.

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Applied Anatomy & Physiology - Paper 1 in Year 2 -Total 100 marks **Practicals** - Total 50 marks

Internal Assessment: 50 marks (Term tests 30 marks + 20 marks for assignments)

Reference 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).

YEAR - II

MICROBIOLOGY

**COURSE
DESCRIPTION**

The course is designed to assist students to acquire understanding of fundamentals of microbiology and identification of microorganisms. It also provides opportunities for practicing infection control measures in hospital settings

OBJECTIVES

At the end of the course, the student will be able to:

1. Identify common disease producing microorganisms
2. Explain the basic principles of microbiology and their significance in health and disease.
3. Demonstrate skill in handling specimens
4. Explain various methods of disinfection and sterilization
5. Identify the role of the nurse in hospital infection control system

COURSE CONTENT

Block 1: Introduction to microorganisms

Unit 1: Microbiological terms

Unit 2: History of microbiology

Hypersensitivity reactions

Block 2: Major groups of microorganisms

Unit 1: Structure and classification of microbes Unit 2:

Identification methods of microorganisms

Block 3: Infection control

Unit 1: Introduction to infection, spread and transmission of infection Unit

2: Sterilization and disinfection

Unit 3: Cleaning and sterilizing equipment Unit

4: Disposal of waste

Unit 5: Surveillance, quality control

Unit 6: Control of organisms with antibiotics

Unit 7: Vaccines, toxoids – bacterial, viral, immunization schedule Unit

8: Barrier nursing, universal precautions

Block 4: Specific infections

Unit 1: Nosocomial infections – VAP, CRBSI, UTI, SSI, NSI

Unit 2: Bacterial – Gram Positives & Negatives, infections caused

Unit 3: Viral – HIV, Hep B, HCV, other common viral infections

Unit 4: Fungal

Unit 5: Parasitic

Unit 6: Tropical infections - Tb, malaria, leptospirosis, dengue, rickettsia, amoebiasis

Unit 7: Applied Microbiology : RTI, UTI, Sepsis

PRACTICALS

1. Collection and handling of clinical specimens-urine, sputum, blood and pus.
2. Demonstration and handling of microscope
3. Staining-gram staining, Zeihl Neelsen
4. Common examination: stained smears, Fungus-Yeasts and Molds
5. Sterilization-incineration and Autoclaving
6. Each student will practice aseptic procedures in the wards and maintain personal and Environmental hygiene.
7. Observation visit to incinerator, posting in CSSD and infection control department

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Clinical Microbiology - Paper 2 in Year 2 -

Total 100 marks **Practicals** - Total 50 marks

Internal Assessment: 50 marks (Term tests 30 marks + 20 marks for assignments)

Reference Books

1. Ananthnarayan R: Textbook of Microbiology. (2017)
2. Pommerville J. C: Fundamentals of Microbiology. Jones and Bartlett learning (2013)
3. Apurba Sastry, Sandhya Bhat. Essentials of Microbiology

YEAR – II

BIOMEDICAL ENGINEERING

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of basics of electricity and electronics. It is also designed to assist students in understanding the basics of the equipment used in the ICU.

OBJECTIVES

At the end of the course, the student will be able to:

1. Describe fundamentals of Electricity and Electronics.
2. Describe the types and uses of medical equipment

COURSE CONTENT

Block 1: Fundamentals of Electricity & electronics

Unit 1: Resistance

Unit 2: Capacitance

Unit 3: Inductance and transformers

Unit 4: Parameters of electricity – voltage, current, power

Unit 5: Difference between AC and DC current, phase, neutral, earth, color coding

Unit 6: Ohm's law, Kirchhoff's law – electrical circuits

Unit 7: Classification of medical equipment

Section 1: According to type of protection: B, C, and F etc. Section 2:

According to mode of protection: Class I - III

WEIGHTAGE OF MARKS

Theory: ICU monitoring – I (basic) and Biomedical engineering

Paper 3 in Year 2 - Total 100 marks (ICU monitoring – 75 marks, biomedical engineering – 25 marks)

Practicals - None

Internal Assessment: 50 marks - Biomedical engineering – 15 + ICU monitoring - 35

Biomedical engineering internal assessment

Term tests 10 marks
Assignments 5 marks

YEAR - II

ICU MONITORING I

(BASIC) COURSE DESCRIPTION

This course is designed to enable students to understand the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU.

OBJECTIVES

At the end of the course the students will be able to:

1. To describe the basic principles of monitoring of respiratory system, cardiovascular system, CNS, nutritional status, renal function and liver function of patient in ICU
2. To identify the benefits and risks of ICU monitoring techniques.
3. To describe monitoring techniques used in ICU for a mechanically ventilated patients.
4. To describe monitoring techniques used in ICU for patients in shock.
5. To describe monitoring techniques used in ICU to monitor neurological status, renal function and liver function.

COURSE CONTENT

Block 1: General monitoring

Unit 1: Temperature monitoring

Section 1: Principles of temperature monitoring

Section 2: Hypothermia and hyperthermia

Unit 2: Pulse

Unit 3: Positioning of patient

Unit 4: Monitoring for pressure sores

Block 2: Respiratory System

Unit 1: Airway monitoring- Intubation

- Securing ET tube
- Cuff pressure

Unit 2: Monitoring Gas Exchange

Section 1: Oxygenation

- ABG

- Pulse Oximetry
 - Oxygen delivery and consumption
- Section 2: Ventilation

- ABG
- Capnography

Section 3: Calculations

- Oxygen consumption
- Alveolar gas equations
- Dead space

Unit 3: Monitoring muscle strength, work of breathing

Unit 4: PFT - Recognize the methods & significance of measuring the following lung volume and flow in the ICU.

- Tidal volume
- Vital capacity
- Peak flow rate
- Negative inspiratory pressure

Block 3: Cardiovascular System

Unit 1: ECG

Unit 2: NIBP

Unit 3: Invasive arterial blood pressure- Cardiac Input Monitoring

Unit 4: CVP monitoring

Unit 5: Zeroing, calibration, trouble shooting of pressure transducers.

Block 4: Nervous system

Unit 1: Neurological history and examination, pupils, Muscle strength

Unit 2: Glasgow Coma Scale

Unit 3: ICP Monitoring

Unit 4: BIS Monitoring

Block 5: Abdomen / Renal

Unit 1: Intra-abdominal pressure monitoring

Unit 2: Monitoring renal function:

- Clinical – Urine output
- Laboratory- creatinine, creatinine clearance

PRACTICALS

1. Assignments
2. Clinical audit to be started in 2nd year and completed by 3rd year
3. Observation of equipment handling & maintainance

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: ICU monitoring – I (basic) and Biomedical engineering

Paper 3 in Year 2 - Total 100 marks (ICU monitoring – 75 marks,
biomedical engineering – 25 marks)

Practicals – 50 marks

Internal Assessment: 50 marks

Biomedical engineering – 15

ICU monitoring - 35

ICU monitoring internal assessment

Term tests 20 marks

Assignments 15 marks

Reference Books

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller, Craig L Scalan (Mosby)
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials I John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell)

Scientific Publications)

6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
9. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
10. Washington Manual of Critical Care

YEAR II
PHARMACOLOGY

**COURSE
DESCRIPTION**

The course is designed to assist students to acquire understanding of fundamentals of drugs and their mode of action. It also provides opportunities for practicing infection control measures in hospital settings. It also helps to assist the students to use knowledge of pharmacology in practice of critical care technology.

OBJECTIVES

At the end of the course, the student will be able to:

1. To identify drugs used in ICU and describe their pharmacology, administration, uses and adverse effects.
2. To describe pharmacology of vasopressors and inotropes.

COURSE CONTENT

Block 1: Introduction to pharmacology

Unit 1: Pharmacokinetics

Unit 2: Pharmacodynamics

- Drug dose calculation – Dilution, infusion rate

Unit 3: Pharmacovigilance – should be able to identify & report adverse drug reactions.

Block 2: Medical gases: O₂, N₂O, compressed Air

Block 3: Anaesthetic agents

Unit 1: Sedatives: barbiturates, benzodiazepines, propofol, and ketamine

Unit 2: Analgesics: NSAID's, Aspirin, opioids

Unit 3: Neuromuscular blockers

Unit 4 : Local Anaesthetics

Block 4: Drugs affecting the autonomic nervous system

Unit 1: Adrenergic drugs

Section 1: Inotropic agents, chronotropic agents

Section 2: Vasopressors & Vasodilators

Section 3: Anti-hypertensive

Section 4: Bronchodilators- OHA & Insulin - Antidiabetic

Unit 2: Cholinergic drugs

Section 1: Atropine, glycopyrrolate

Section 2: Ipratropium

Block 5: Mucokinetic agents:

Unit 1: Expectorant

Unit 2: Mucolytics

Unit 3: Mucokinetics

Unit 4: Mucoregulatory agents

Unit 5: Others e.g. Bromohexine, ambroxol, saline, soda bicarbonate

Block 6: Cough suppressants Unit

1: Peripheral antitussives Unit 2:

Central antitussives

Unit 3: Peripheral and central antitussives

Block 7: Respiratory stimulants

Unit 1: Specific e.g. Naloxone, flumazenil

Unit 2: Non-specific e.g. xanthines, nicotine, doxapram

Block 8: Antihistamines

Block 9: Steroids

Block 10: Antimicrobial drugs

Unit 1: Antibacterial, antiviral and anti-fungal agents – basic concepts

Unit 2: Antimicrobial Resistance – Basic concepts Unit 3:

Antiseptic agents

Unit 4: Immuno suppression

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration

3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Pharmacology & Pathophysiology

Paper 4 in Year 2 - Total 100 marks (Pharmacology – 50,
Pathophysiology – 50)

Practicals - None

Internal Assessment: 50 marks – Pharmacology 25, Pathophysiology - 25

Term tests 15 marks

Assignments 10 marks

Reference Books

1. Tripathi K. D: Essentials of Medical Pharmacology. JPB, (2013)
2. Smeltzer – Brunner & Siddhartha Textbook of Medical Surgical Nursing, 2010,LWW
3. Black – Medical Surgical Nursing, 2009, Elsevier
4. Nettina – Lippincott manual of Nursing Practice, 2009. LWW
5. Lewis – medical Surgical Nursing, 2008, Elsevier

YEAR II
PATHOLOGY & PATHOPHYSIOLOGY

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of the fundamentals of pathology and pathophysiology in disease states.

OBJECTIVES

At the end of the course, the student will be able to describe the basic pathology and pathophysiology of the important disease states of respiratory system, cardiovascular system, CNS, hematology, renal and GI system in ICU settings.

COURSE CONTENT

Block 1: General

Unit 1: Inflammation and healing

Unit 2: Tumors

Unit 3: Immune system

Block 2: Respiratory system

Unit 1: Respiratory failure

Unit 2: Acute respiratory distress syndrome

Unit 3: Pneumonia, TB

Unit 4: Opportunistic infections Unit

5: Bronchial asthma and COPD

Unit 6: Bronchiectasis and Lung abscess

Unit 7: Atelectasis, collapse

Unit 8: Pleural disease: Pneumothorax, pleural effusion

Unit 9: Occupational lung diseases - Smoke inhalation ,
Pneumoconiosis

Block 3: Cardiovascular

Unit 1: Shock: hypovolemic, cardiogenic, obstructive, septic Unit 2:

Hypertension in ICU

Unit 3: Congestive cardiac failure, acute Left ventricular failure, Right ventricular failure

Unit 4: Pulmonary edema

Unit 5: Pulmonary Hypertension

Unit 6: Pulmonary embolism

Unit 7: Ischemic heart disease

Block 4: CNS

Unit 1: Cerebrovascular disease (stroke)Unit 2:

Coma

Unit 3: Delirium in ICU

Unit 4: Neuromuscular disease

Section 1: Myasthenia gravis

Section 2: Critical illness polyneuropathy

Section 3: Diaphragmatic paralysis

Unit 5: Guillian Barre syndrome

Unit 6: Brain death, Persistent vegetative stateUnit

7: Trauma

Section 1: Head injury

Section 2: Unstable spine and protection

Block 5: Haematology

Unit 1: Anemia in ICU/VAP (Ventilator Associated Pneumonia)

Unit 2: Neutropenia

Unit 3: Bleeding disorders

Unit 4: Clotting disorders

Block 6: GIT, Liver, Pancreas, Renal, Endocrine

Unit 1: Upper GI bleed

Unit 2: Hepatic coma

Unit 3: Pancreatitis

Unit 4: Renal failure in ICU

Unit 5: Hypoglycemia

Unit 6: Hyperglycemia

Unit 7: Disorders Sodium, Potassium and Fluid balance.Unit

8: Stress response role of Adrenals

Block 7: Miscellaneous

Unit 1: Envenomation – snake bite, scorpion sting

Unit 2: Poisoning – general supportive care, common poisons

PRACTICALS – NONE

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record
4. Interpretation of Lab reports

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: Pharmacology & Pathophysiology

Paper 4 in Year 2 - Total 100 marks (Pharmacology – 50,
Pathophysiology – 50)

Practicals - None

Internal Assessment: 50 marks – Pharmacology 25, Pathophysiology - 25

Term tests 15 marks

Assignments 10 marks

REFERENCE 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

YEAR – III

ICU MONITORING- II (ADVANCED) AND EQUIPMENT MAINTENANCE

COURSE DESCRIPTION

This course is designed to enable students to understand in detail the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU. It is designed to assist students in understanding the details of the techniques and equipment used for monitoring the patient in ICU and their troubleshooting.

OBJECTIVES

At the end of the course the students will be able to:

1. Describe in detail the principles of basic and advanced monitoring of respiratory system, cardiovascular system, CNS, nutritional status, renal function and liver function of patient in ICU
2. Describe in detail monitoring techniques used in ICU for a mechanically ventilated patients.
3. Describe principles and methods of hemodynamic monitoring.
4. Describe monitoring of brain stem function and nutritional monitoring.
5. Describe principles of maintenance of equipment used in ICU.
6. Describe the various aspects of equipment troubleshooting.

COURSE CONTENT

Block 1: Respiratory system

Unit 1: Monitoring lung and chest wall mechanics

- Compliance
- Resistance
- Pressures
- Auto PEEP

Volumes

Unit 2: Monitoring muscle strength, work of breathing, Maximum inspiratory and expiratory pressures

Unit 3: Monitoring patient ventilator system, Graphics monitoring Unit 4:

Bedside PFT

Block 2: Cardiovascular System

Unit 1: Assessment of Preload responsiveness static and dynamic parameters

Unit 2: Basic Echocardiography in ICU/ Ultrasound in Critical Care

Unit 3: Defibrillator and Cardioversion

Unit 4: PICCO

Unit 5: Monitoring tissue perfusion

Unit 6: Pulmonary artery catheters

Unit 7: Temporary pacemaker

Block 3: CNS

Unit 1: Monitoring brain stem function

Unit 2: Sedation and analgesia scoring

Block 5: Nutritional monitoring

Unit 1: Functional nutritional assessment (history and physical examination)

Unit 2: Metabolic assessment

Unit 3: Estimating nutritional requirements

Block 6: Care & maintenance of ICU equipment & Troubleshooting

(Includes quality checks and calibrations of all the equipment)

Unit 1: Mechanical Ventilators & Non-invasive ventilators Unit

2: Pumps: Infusion, syringe

Unit 3: Monitors: Stand-alone & multi-parameter, Cardiac Output monitors.

Unit 4: ECG machine

Unit 5: ABG machine

Unit 6: Defibrillator

Unit 7: Ultrasound machine

Unit 8: Bronchoscope

Dialysis Machine

PRACTICALS

- 1) Log book and project completion for internal assessment
- 2) Should know the workings of all ICU equipment
- 3) Should know care and maintenance of all ICU equipment
- 4) Should be able to monitor ventilator parameters
- 5) Should be able to assess fluid responsiveness in a patient

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: ICU monitoring – II (Advanced) and Equipment maintenance

Paper 1 in Year 3 - Total 100 marks (ICU monitoring advanced 75marks,
Equipment maintenance – 25 marks)

Practicals – 50 marks

Internal 50 marks
Assessment:

Term tests	30 marks
Assignments (log book & project)	20 marks

REFERENCE BOOKS

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials | John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care

YEAR - III

ICU THERAPY

COURSE DESCRIPTION

This course is designed to assist students in developing expertise and in depth knowledge in the field of critical care technology. It will help students to appreciate the patient as a holistic individual and develop skill to function as a specialized critical care technologist.

OBJECTIVES

At the end of the course the students will be able to:

1. Discuss in detail the concept of Mechanical Ventilation
2. Describe in detail the design features of ventilators, their types, how they work and the various modes of ventilation
3. Describe in detail the care of patient on ventilator and weaning from ventilator.
4. Discuss in detail the Basic and Advanced Life Support.
5. Discuss in detail the care of unconscious patient.

COURSE CONTENT

BLOCK 1: Mechanical ventilation/ventilator dependence/difficult weaning

Unit 1: Basic Concept

- Mechanics of ventilation
- Mechanics of exhalation Work of breathing
- Distribution of ventilation
- Efficiency and effectiveness of ventilation Indications
- Mechanical Ventilators How ventilators work
- Operator interface Types of ventilators

Unit 2: Modes of Mechanical Ventilation

- Basic and newer modes Ventilator initiation
- Initial ventilator settings
- Adjusting ventilatory settings

- Oxygenation

- Ventilation
- Timing – Inspiratory of gas / Expiratory, inspiratory hold Flow
- Tidal volume
- Pressure- Peak /Plateau
PEEP
- POP – OFF
- Pressure support
- Proximal airway (VS) distal
FiO₂

Unit 3: Humidification

- Humidifier types
- Advantages & disadvantages

Unit 4: Non-Invasive Ventilation

- Types of NIV (CPAP, BIPAP)
- Goals of & indications of NIV
- Patient selection and exclusion criteria for NIV
Equipment used in the application of NIV
Instituting and managing NIV
- Complications of NIV
- Time & cost associated with NIV

Unit 5: Trouble shooting and alarms

Unit 6: Weaning and Extubation

- Weaning
- Definitions
- Reasons for ventilator dependence
Patient evaluation
- Preparing the patient
Methods
- Newer techniques for facilitating ventilator discontinuance
Selecting an approach
Monitoring the patient during weaning
- Chronically ventilator dependent patients & difficulty in weaning

- Terminal weaning
Extubation

- Indications
Procedure
- Post extubation care

Unit 7: Nebulization and MDI

- Inhaled drug therapy
Nebulization
Different types
- Advantages & disadvantages
MDI with spacer
- Characteristics of therapeutic aerosols
Hazards of aerosols therapy
- Aerosol drug delivery system
- Assessment based bronchodilator therapy
protocols
Special considerations
- Controlling environmental and contamination

Unit 8: Suctioning and chest physiotherapy

Unit 9: Incentive Spirometry

Unit 10: Inspiratory resistance exercises

Unit 11: Care of Patient on Ventilator

- Ensuring proper placement
 - Cuff pressure
 - Tracheo bronchial hygiene & suctioning
Humidification, chest physiotherapy
Ventilator settings
- Monitoring ventilatory parameters

Unit 12: Care of the chest tube

Drainage systems of pleural with fluid
Unit

13: Extubation failure

Block 2: Airway Assistance

Unit 1: Tracheal intubation (oral, nasal) – Insertion of ICD

Unit 2: Cricothyrotomy

Unit 3: Open/percutaneous tracheostomy

Unit 4: Fiberoptic bronchoscopy

Section 1: FOB Intubation

Section 1: Therapeutic BAL
Unit 5: Decanulation of tracheostomy

Block 3: Cardiovascular system

Unit 1: Fluid resuscitation and inotropes

Unit 2: Basic of IABP /ECMO

Unit 3: Pericardiocentesis

Block 4: Life support

Unit 1: Basic life support

- AED, Mask ventilation, Chest compression

Unit 2: Advanced cardiac life support

- Drugs, defibrillation

Unit 3: Trauma life support

A –Airway and cervical spine stabilization

B – Breathing

C –Circulation and hemorrhage control

D –Disability

E-Exposure
D Manual in line stabilization
Basic care of surgical wounds and fractures

Unit 4: Burns Assessment

Section 1: History and physical assessment

Section 2: Assessment of burns and fluid and electrolyte loss

Section 3: Etiology classification, Pathophysiology, clinical manifestations, Diagnosis, treatment modalities

Block 5: Renal / Abdomen

Unit 1: Basics of Renal Replacement Therapy, modes of dialysis

Unit 2: Intra-abdominal pressure, abdominal compartment syndrome

Block 6: Central Nervous system

Unit 1: Care of Unconscious Patient, Comfort Section

1: Skin integrity assessment and care

Section 2: Physiotherapy – chest & limbs

Section 3: Nutritional needs & supply

Unit 2: Pain Control, Care of epidural, Patient controlled analgesia

Block 7: Infection Control

Unit 1: Hand hygiene

Unit 2: Universal precautions

Isolation

PRACTICAL

- Clinical rotations in selected Medical and Surgical areas
- Patient assignments for patient centered comprehensive care
- Case presentations,
- Drug study discussion

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: ICU therapy

Paper 2 in Year 3 - Total 100 marks

Practicals – 50 marks

Internal Assessment: 50 marks

Term tests

30 marks

REFERENCE BOOKS

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials | John B West (Williams & Wilkins)
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7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care
12. Smeltzer – Brunner & Suddharth Textbook of Medical Surgical Nursing, 2010,LWW
13. Black – Medical Surgical Nursing, 2009, Elsevier
14. Nettina – Lippincott manual of Nursing Practice, 2013. LWW
15. Lewis – medical Surgical Nursing, 2008, Elsevier
16. Davidson's Principles &Practice of Medicine, 2010, Elsevier
17. Bailey & Love Short Practice of Surgery, 2013, Hodder Arnold
18. Timby – Introductory Medical Surgical Nursing, 2013, WK
19. Das – textbook of Surgery, SD Publishers
20. Woods – Cardiac Nursing, 2010, LWW
21. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
22. Morton – Critical Care Nursing, 2009, LWW

23. Thelan's Critical Care Nursing, 2013, Elsevier
24. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
25. Webber – Health assessment in Nursing, 2010, WK

YEAR – III

ICU ADMINISTRATION, LOGISTICS, ETHICS, COMMUNICATIONS, MANAGEMENT AND STATISTICS

COURSE DESCRIPTION

This course is designed to enable students to understand in the principles of ICU administration, patient safety and transport. It is designed to assist students in understanding the principles of medical ethics and communication.

OBJECTIVES

At the end of the course the students will be able to:

1. Describe the principles of basic ICU administration
2. Describe various aspects of medical ethics.
3. Describe the medico-legal aspects of medical records
4. Describe the principles of communication and counseling.
5. Describe all the aspects of patient safety and patient transport.
6. Understand the basic principles of management

COURSE CONTENT

Block 1: Basic administration

Unit 1: Economic issues in ICU

Unit 2: Raising purchase orders for equipmentUnit

3: Maintaining consumable stock

Unit 4: Equipment repair

Block 2: CSSD Procedures

Unit 1: Waste disposal collection of used items from user area, reception protective clothing and disinfection safe guards.

Unit 2: Disinfection in ICU –Surfaces

- Reusable equipment and accessories

Unit 3: Wrapping & packing

Unit 4: General principles of sterilization Section 1: Moist heat sterilization Section 2:

Dry heat sterilization Section3:
Chemical sterilization

- EO gas sterilization
- H₂O₂ gas plasma vap sterilization

Block 3: Medical ethics

Unit 1: Medical ethics –Definition – Goal – Scope

Unit 2: Code of conduct

Section 1: Introduction

Section 2: Basic principles of medical ethics

Section 3: Confidentiality

Section 4: Autonomy and Informed consent – Right of patients

Unit 3: Care of the terminally ill – Euthanasia, withdrawal, withholding support

Unit 4: Organ transplantation

Unit 5: Medico legal aspects of medical records

Unit 6: Medico-legal case and type – Records and document related toMLC

Unit 7: Ownership of medical records –

Unit 8: Confidentiality Privilege

communication – Release of
medical information –

Unauthorized disclosure – retention of medical records –
other various aspects.

Block 4: Communication and counseling

Unit 1: Basic principles

Block 5: Basics of statistics

Unit 1: Basic concepts in measurement

Section 1: Scales of measurements

Section 2: validity, reliability, variation, measurementsystem,
conversion.

Unit 2: Basic descriptive statistics

Section 1: Central tendency, mean, mode, median. Section 2:

Dispersion range, variance, standard deviation

Unit 3: Concept of normal and abnormal

Block VI: Patient safety and transport

Unit 1: Electrical safety

Unit 2: Fire safety

Unit 3: Intra-hospital Patient transport

Unit 4: Inter-hospital Patient transport

Block VII: Principles of management

Unit 1: Basic principles of Management – functions, types, importance, motivation etc.

Unit 2: Personnel management – staffing, orientation, disciplining, complaints etc

Unit 3: Financial management – short and long term

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Record Book
3. Assignments
4. Oral Presentations

WEIGHTAGE OF MARKS

Theory: ICU administration, logistics, ethics, communications, management and statistics

Paper 3 in Year 3 - Total 100 marks

Practicals - None

Internal Assessment: 50 marks

Term tests 30 marks

Assignments 20 marks

SCHEME OF EXAMINATION

FIRST YEAR

Subjects	Internal assessment		Theory		Practical		Total	
	Max	Min	Max	Min	Max	Min	Max	Min
Paper 1: Anatomy + Applied Anatomy + Biochemistry (Anatomy 75% + Biochemistry 25%)	50	25	100	50	50	25	200	100
Paper 2: Physiology + Basic Physics (Physiology 75% + Physics 25%)	50	25	100	50	50	25	200	100
Paper 3: Computers + English (Computer 50% + English 50%)	50	25	100	50	50	25	200	100

SECOND YEAR

Subjects	Internal assessment		Theory		Practical		Total	
	Max	Min	Max	Min	Max	Min	Max	Min
Paper 1: Anatomy + Applied Anatomy & Physiology	50	25	100	50	50	25	200	100
Paper 2: Clinical Microbiology	50	25	100	50	50	25	200	100
Paper 3: ICU Monitoring I (Basic) & Biomedical engineering (ICU Monitoring 75% + Biomedical engineering 25%)	50	25	100	50	50	25	200	100
Paper 4: Pathology, pathophysiology & Pharmacology (Pathology 50% + Pharmacology 50%)	50	25	100	50	-	-	150	75

THIRD YEAR

Subjects	Internal assessment		Theory		Practical		Total	
	Max	Min	Max	Min	Max	Min	Max	Min
Paper 1: ICU Monitoring II + Maintenance of equipment (ICU Monitoring 75% + Maintenance 25%)	50	25	100	50	50	25	200	100
Paper 2: ICU Therapy	50	25	100	50	50	25	200	100
Paper 3: ICU Administration + Logistics + Statistics + Medical Ethics	50	25	100	50	-	-	150	75

POSTINGS DURING ONE YEAR INTERNSHIP

IMCU	- 3 Months
PACU (Post Anaesthetic Care Unit)	- 3Months
Coronary Care Unit (CCU)	- 2 Months
RICU	- 2 Months
Nephrology (Dialysis Unit)	- 15 days
NICU/PICU	- 15 days
CSSD/Sterilisation	- 15 days
Labs	- 15 days

PROCEDURAL SKILLS

I Year BSc Critical Care Technology Course

OBSERVE	ASSIST	DO
Hand washing		Hand washing
Universal Precautions	Universal Precautions	Universal Precautions
Wearing clean/sterile gloves		Wearing clean/sterile gloves
Bed side manners		Bedside manners
Assessment of Consciousness sAVPU Score		Assessment of Consciousness sAVPU Score
Placement of pulse oximeter probe	Placement of pulse oximeter probe	Placement of pulse oximeter Probe and ECG probes
Placement of ECG leads	Placement of ECG leads	
Applying NIBP cuff	Applying NIBP cuff	
Mask ventilation		
Endotracheal intubation		
Connection of patient to ventilator		
Documentation		
Waste segregation and disposal		Waste segregation and disposal

PROCEDURAL SKILLS

II Year BSc Critical Care Technology

Course In addition to Skills required in I Year

B SERVE/ CLASS	ASSIST	DO
Applying NIBP cuff	Applying NIBP cuff	Applying NIBP cuff
Peripheral line insertion	Peripheral line insertion	
Placement of ECG leads	Placement of ECG leads	Placement of ECG leads
ECG recording	ECG recording	ECG recording
Basic ECG interpretation	Basic ECG interpretation	Basic ECG interpretation
Central line insertion	Central line insertion	
Arterial line insertion	Arterial line insertion	
Setting up arterial transducer	Setting up arterial transducer	Setting up arterial transducer
Bedside Pulmonary Function Test	Bedside Pulmonary Function Test	Bedside Pulmonary Function Test
Mask ventilation	Mask ventilation	
Endotracheal intubation		
Endotracheal suctioning	Endotracheal suctioning	Endotracheal suctioning
Endotracheal tube fixing	Endotracheal tubefixing	
Checking ETT cuff pressure	Checking ETT cuff pressure	
Setting up ventilator	Setting up ventilator	
Placement of pulse oximeter probe	Placement of pulse oximeter probe	Placement of pulse oximeter probe
Connecting Ventilator to patient	Connecting Ventilator to patient	
Humidification	Humidification	Humidification
Nebulization	Nebulization	Nebulization
Chest tube insertion	Chest tube insertion	
Monitoring ventilator Parameters	Monitoring ventilator parameters	Monitoring ventilator parameters

Basic ABG interpretation	Basic ABG interpretation	Basic ABG interpretation
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Extubation process	Extubation process	
Post extubation care	Post extubation care	
Chest physiotherapy	Chest physiotherapy	Chest physiotherapy
Incentive spirometry	Incentive Spirometry	Incentive Spirometry
Setting up EtCO2	Setting up EtCO2	Setting up EtCO2
Setting up Intra-abdominal pressure transducer	Setting up Intra-abdominal pressure transducer	Setting up Intra-abdominal pressure transducer
Haemodialysis canulation	Haemodialysis canulation	
Pressure sore monitoring	Pressure sore monitoring	Pressure sore monitoring
CXR interpretation	CXR interpretation	Chest X Ray interpretation
Brain death certification		
Setting up O2 cylinder for transport of patient	Setting up O2 cylinder for transport of patient	Setting up O2 cylinder for transport of patient
Setting up Monitors for transport of patient	Setting up Monitors for transport of patient	Setting up Monitors for Transport of Patient
Care and maintenance of ventilator	Care and maintenance of ventilator	Care and maintenance of ventilator
Care and maintenance of NIV	Care and maintenance of NIV	Care and maintenance of NIV
Care and maintenance of infusion/syringe pump	Care and maintenance of infusion/syringe pump	Care and maintenance of infusion/syringe pump
Care and maintenance of monitor	Care and maintenance of monitor	Care and maintenance of monitor
Defibrillator calibration	Defibrillator calibration	Defibrillator calibration
Setting up transducer for Intracranial pressure monitoring	Setting up transducer for Intracranial pressure monitoring	
Wrapping and packing reusable equipment for sterilization	Wrapping and packing reusable equipment for sterilization	Wrapping and packing reusable equipment for sterilization

PROCEDURAL SKILLS

III Year BSc Critical Care

Technology Course In addition to Skills required in I and II Year

OBSERVE	ASSIST	DO
Bedside Pulmonary Function Testing	Bedside Pulmonary Function Testing	Bedside Pulmonary Function Testing
Fiberoptic intubation		
Connecting Ventilator to patient	Connecting Ventilator to patient	Connecting Ventilator to patient
Troubleshooting ventilator	Troubleshooting ventilator	Troubleshooting ventilator
Extubation process: cuff leak test	Extubation process: cuff leak test	Extubation process: cuff leak test
Bronchoalveolar lavage	Bronchoalveolar lavage	
Tracheostomy		
Defibrillation	Defibrillation	
Temporary pacemaker insertion		
GCS scoring	GCS scoring	GCS scoring
Setting up transducer for Intracranial pressure monitoring	Setting up transducer for Intracranial pressure monitoring	Setting up transducer for Intracranial pressure monitoring
Insertion of external ventricular drain (EVD)	Insertion of external ventricular drain (EVD)	
Transport of patient out of ICU	Transport of patient out of ICU	Transport of patient out of ICU
APACHE scoring		APACHE scoring