MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

Manipal College of Health Professions

Manipal Academy of Higher Education, Manipal

Outcome-Based Education (OBE) Framework

Four years Full time
Undergraduate Program

Bachelor of Science in
Respiratory Therapy (B.Sc. RT)

With effect from July 2020

T A B L E O F C O N T E N T S

Head of the Department **Dean**

Deputy Registrar - Academics **Registrar**

1. NATURE AND EXTENT OF THE PROGRAM

The Respiratory Therapy education program was started for the first time in India, in September1995 under the auspices of the Department of Anaesthesiology, Kasturba Medical College, MANIPAL ACADEMY OF HIGHER EDUCTION (MAHE), a Deemed University at Manipal, India. This was done under the initial guidance and direction given by the School of Allied Health Professions, Loma Linda University, California, USA. MAHE initiated this 4-year degree course consisting of 3 years of course work and 1 year of clinical rotations (internship). The course and the syllabus meet international standards.

Course Description

Respiratory therapy is an allied medical specialty concerned with the evaluation and treatment of patients who have breathing problems. Therapists are in demand in hospitals and hospital-related organizations to provide direct patient care to those with acute and chronic respiratory problems. The field of respiratory therapy is growing rapidly. Diagnosis and management of adult respiratory disorders needing intensive care, neonatal and pediatric intensive care, and pulmonary function testing, pulmonary rehabilitation, teaching and research opportunities are areas that offer opportunities to the respiratory therapist for professional growth and personal satisfaction.

Aims of the Program

To enable students to achieve the personal, professional and academic development required becoming competent respiratory therapists with the ability to meet the needs of patients and adapt to the changing context of health and social care provision.

To promote life-long learning and professional development for the benefit of students, the profession and to increase the effectiveness of health and social care delivery.

Successful completion of the program will enable the student to be awarded a Bachelor of Respiratory Therapy degree.

Professional Aims:

By the end of the program students should be familiar with:

- Respiratory care man oeuvres including but not restricted to controlled oxygen therapy
- Humidification and administration of aerosols such as bronchodilators, mucolytics, mucokinetics and steroids using small volume nebulisers, ultrasonic nebulisers and metered dose inhalers
- Postural drainage, chest physiotherapy and clearance of pulmonary secretions.
- Instructions for breathing exercises

- Performance and interpretation of pulmonary function tests (including arterial blood gas sampling)
- Continuous cardiac and respiratory monitoring of critically ill patients in the ICU
- Initiation, maintenance and weaning off ventilatory support in adults, older children and neonates
- Institution of noninvasive ventilation using well-fitting nasal and full-face masks
- Monitored transport of patients
- Assisting at clinical procedures such as endotracheal intubation, tracheostomy, bronchoscopy, insertion of central venous pressure lines, pulmonary artery catheters, *etc.*
- Care of patients on long-term artificial airways such as nasotracheal/oro tracheal tubes, care of tracheostomised patients (including decannulation procedures)
- Preoperative and postoperative care of surgical patients (such as those with restrictive lung disorders *e.g.,* scoliosis) needing instruction and assistance at performing breathing exercises
- Pulmonary Rehabilitation
- ♦ Attending emergency calls for cardiopulmonary resuscitation

Entry Requirements

1. Qualifications:

- The candidate must have passed 10+2/A level IB/ American 12th grade of equivalent with Physics, Chemistry, Biology and English as subjects.
- The candidate should have obtained an aggregate of at least 60% in Physics, Chemistry and Biology.

The scope of Respiratory Therapy includes:

- ♦ Clinical assessment of patients with cardio respiratory disorders
- ♦ Administration of medical gases including oxygen, helium and nitric oxide
- ♦ Provision of humidification of respired gases
- ♦ Administration of respiratory drugs such as bronchodilators, mucolytics, mucokinetics
- ♦ Chest physiotherapy, postural drainage and clearance of secretions
- ♦ Performing and interpreting pulmonary function tests and ABG
- ♦ Initiation, maintenance and weaning patients off mechanical ventilation
- ♦ Pulmonary rehabilitation program (including cessation of smoking)
- ♦ Perform and assist for emergency cardiac life support elsewhere

2. PROGRAM EDUCATION OBJECTIVES (PEOs)

The overall objective of the learning outcome-based curriculum framework (LOCF) for Bachelor of Science in Respiratory Therapy Program are as follows:

PEO No.	Education Objective
PEO 1	Students will be able to use their fundamental knowledge and clinical competence in Respiratory Therapy as and when required to achieve professional excellence.
PEO 2	Students will demonstrate strong and well defined clinical / practical skills in respiratory care plans and procedures.
PEO 3	Students will be able to practice the profession with highly professional and ethical attitude, strong communication skills, and effective professional skills to work in a inter-disciplinary team.
PEO 4	Students will be able to use interpersonal and collaborative skills to identify, assess and formulate problems associated with the patients requiring any respiratory support and troubleshoot.
PEO 5	Students will be able to imbibe the culture of research, innovation, entrepreneurship and incubation.
PEO 6	Students will be able to participate in lifelong learning process for a highly productive career and will be able to relate the concepts of treating the critically ill, homecare respiratory needs and pulmonary rehabilitation towards serving the cause of the society.

3. GRADUATE ATTRIBUTES

S No.	Attribute	Description
1	**Professional Knowledge**	Demonstrate **scientific knowledge and understanding** to work as a health care professional
2	**Clinical / practical skills**	Demonstrate **Clinical / practical skills** in order to implement the preventive, assessment and management plans for quality health care services
3.	**Communication**	Ability to communicate effectively and appropriately in writing and orally to patients/clients, care-givers, other health professionals and other members of the community
4.	**Cooperation/Team work**	Ability to work effectively and respectfully with interdisciplinary team members to achieve coordinated, high quality health care
5.	**Professional ethics**	Ability to identify ethical issues and apply the ethical values in the professional life
6.	**Research / Innovation-related Skills**	A sense of inquiry and investigation for raising relevant and contemporary questions, synthesizing and articulating.
7.	**Critical thinking and problem solving**	Ability to think critically and apply once learning to real-life situations
8.	**Reflective thinking**	Ability to employ reflective thinking along with the ability to create the sense of awareness of one self and society
9.	**Information/digital literacy**	Ability to use ICT in a variety of learning situations
10.	**Multi-cultural competence**	Ability to effectively engage in a multicultural society and interact respectfully
11.	**Leadership readiness/qualities**	Ability to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively
12.	**Lifelong Learning**	Every graduate to be converted into lifelong learner and consistently update himself or herself with current knowledge, skills and technologies. Acquiring Knowledge and creating the understanding in learners that learning will continue throughout life.

4. QUALIFICATION DESCRIPTORS:

a) Demonstrate (i) a fundamental and systematic knowledge and understanding of an academic field of study as a whole and its applications, and links to related disciplinary areas/subjects of study; including a critical understanding of the established theories, principles and concepts, and of a number of advanced and emerging issues in the field of Respiratory Therapy;(ii) Procedural knowledge that creates different types of professionals related to the respiratory therapy, including research and development, teaching and in government and public service; (iii) Professional and communication skills in the affective domain, including a critical understanding of the latest developments, and an ability to use established techniques in the cognitive and psychomotor domain.

b) Demonstrate comprehensive knowledge about respiratory care plans including current research, scholarly, and/or professional literature, relating to essential and advanced learning areas pertaining to the Respiratory Therapy, and techniques and skills required for identifying problems and issues.

c) Demonstrate skills in i) identifying the issues in health care needs; ii) collection of quantitative and/or qualitative data relevant to client's needs and professional practice; iii) analysis and interpretation of data using methodologies as appropriate for formulating evidence based hypotheses and solutions

d) Use knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the Respiratory Therapy.

e) Communicate appropriately with all stakeholders, and provide relevant information to the members of the healthcare team

f) Address one's own learning needs relating to current and emerging areas of study, making use of research, development and professional materials as appropriate, including those related to new frontiers of knowledge

g) Apply one's disciplinary knowledge and transferable skills to new/unfamiliar contexts and to identify and analyse problems and issues and seek solutions to real-life problems.

5. PROGRAM OUTCOMES (POs):

After successful completion of Bachelor / BSc. Respiratory Therapy program, students will be able to:

PO No.	Attribute	Competency
PO 1	**Professional knowledge**	Possess and acquire **scientific knowledge** to work as a health care professional
PO 2	**Clinical/ Technical skills**	Demonstrate and possess **clinical skills** to provide quality health care services
PO 3	**Team work**	Demonstrate **team work skills** to support shared goals with the interdisciplinary health care team to improve societal health
PO 4	**Ethical value & professionalism**	Possess and demonstrate **ethical values and professionalism** within the legal framework of the society
PO 5	**Communication**	**Communicate effectively** and appropriately with the interdisciplinary health care team and the society
PO 6	**Evidence based practice**	Demonstrate high quality **evidence based practice** that leads to excellence in professional practice
PO 7	**Life-long learning**	Enhance knowledge and skills with the use of advancing technology for the **continual improvement** of professional practice
PO 8	**Entrepreneurship, leadership and mentorship**	Display **entrepreneurship, leadership and mentorship** skills to practice independently as well as in collaboration with the interdisciplinary health care team

6. COURSE STRUCTURE, COURSE WISE LEARNING OBJECTIVE, COURSE OUTCOMES (COS)

SEMESTER - I

Course code	Course title	Credit (s) Distribution (L,T,P ,are hours/ week)				Marks Distribution		
		L	T	P	CR	IAC	ESE	Total
ANA1101	Anatomy - I	3	-	-	3	30	70	100
ANA1112	Anatomy Practical - I	-	-	4	2	100	-	100
PHY1101	Physiology - I	2	-	-	2	30	70	100
YGA1121	Yoga	1	-	2	2	100	-	100
EIC1001	Environmental Science & Indian Constitution	2	-	-	2	100	-	100
CSK1001	Communication Skills	2	-	-	2	100	-	100
RES1101	Clinical Anatomy and Physiology for Respiratory Care	2	2	-	4	50	50	100
RES1102	Medical Terminology	1	2	-	3	50	50	100
	Total	**13**	**4**	**6**	**20**	**560**	**240**	**800**

Note: ESE for
- ANA1101 & PHY1101will be conducted for 50 marks and normalized to 70 marks for grading
- RES1101 & RES1102will be conducted for 50 marks.
- ANA1112, YGA1121, EIC1001 & CSK1001has only internal assessment of 100 marks.

SEMESTER - II

Course code	Course title	Credit (s) Distribution (L,T,P are hours/ week)				Marks Distribution		
		L	T	P	CR	IAC	ESE	Total
ANA1201	Anatomy - II	1	-	2	2	30	70	100
ANA1212	Anatomy Practical - II	-	-	4	2	100	-	100
PHY1201	Physiology - II	2	-	-	2	30	70	100
BIC1201	Biochemistry	3	-	-	3	30	70	100
RES1201	Clinical Examination in Respiratory Care	2	2	-	4	50	50	100
RES1202	Respiratory Care Equipment	2	2	-	4	50	50	100
RES1223	Pulmonary Diagnostics - I	2	-	2	3	50	50	100
	Total	**12**	**4**	**8**	**20**	**340**	**360**	**700**

Note: ESE for
- ANA1201, PHY1201& BIC1201 will be conducted for 50 marks and normalized to 70 marks for grading.
- RES1201, RES1202 & RES1223 will be conducted for 50 marks
- ANA1212has only internal assessment of 100 marks

SEMESTER III

Course code	Course title	Credit (s) Distribution (L,T,P are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
MCB2103	Microbiology	3	-	-	-	3	30	70	100
PAT2103	Pathology	3	-	-	-	3	30	70	100
RES2101	Pulmonary Diagnostics - II	1	1	-	-	2	50	50	100
RES2102	Pediatric Respiratory Care	3	-	-	-	3	50	50	100
RES2103	Pulmonary Diseases	2	-	-	-	2	50	50	100
RES2131	Clinical - I	-	-		12	4	100	-	100
*** ****	Open Elective - I	-	-	-	-	3	S/NS		
	Total	**15**	**1**	**-**	**12**	**20**	**310**	**290**	**600**
Note: ESE for MCB2103 & PAT2103 will be conducted for 50 marks and normalized to 70 marks for grading ESE for RES2101, RES2102 & RES2103 will be conducted for 50 marks									

In this semester, it is compulsory for the students to obtain certification in **BASIC LIFE SUPPORT from MAHE program**

SEMESTER IV

Course code	Course title	Credit (s) Distribution (L,T,P are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
GPY2201	General Psychology	2	-	-	-	2	30	70	100
BST3201	Biostatistics and Research Methodology	3	-	-	-	3	30	70	100
RES2201	Community medicine	2	-	-	-	2	100	-	100
RES2202	Respiratory Care Pharmacology	2	1	-	-	3	50	50	100
RES2231	Clinical II	-	-	-	21	7	100	-	100
RES****	Program Elective - I	-	-	-	-	3	50	50	100
	Total	**12**	**4**	**-**	**21**	**20**	**360**	**240**	**600**
Note: ESE for • GPY2201 & BST3201 will be conducted for 100 marks and normalized to 70 marks for grading • RES2202 will be conducted for 50 marks									

SEMESTER V

Course code	Course title	Credit (s) Distribution (L,T,P are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
RES3121	Mechanical Ventilation - I	2	-	2	-	3	50	50	100
RES3101	Neonatal Respiratory Care	2	1	-	-	3	50	50	100
RES3102	Critical Care Monitoring and Management	2	1	-	-	3	50	50	100
RES3131	Clinical- III	-	-	-	24	8	100	-	100
*** ****	Open Elective - II	-	-	-	-	3	S/NS		
Total		**6**	**2**	**2**	**24**	**20**	**250**	**150**	**400**
Note: ESE forRES3121, RES3101 & RES3102 will be conducted for 50 marks.									

In this semester, it is compulsory for the students to obtain certification in **ADVANCED CARDIAC LIFE SUPPORT from MAHE program**

SEMESTER VI

Course code	Course title	Credit (s) Distribution (L,T,P are hours/ week)					Marks Distribution		
		L	T	P	CL	CR	IAC	ESE	Total
RES3201	Chronic Respiratory Disease Management	2	1	-	-	3	50	50	100
RES3222	Mechanical Ventilation - II	2	-	4	-	4	50	50	100
RES3231	Clinical - IV	-	-	-	30	10	50	50	100
RES****	Open elective - II	-	-	-	-	3	50	50	100
Total		**9**	**2**	**4**	**30**	**20**	**200**	**200**	**400**
Note: ESE for • RES3201 & 304 will be conducted for 50 marks									

Open Electives
Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department

Program Electives
Program elective is credited and choice-based. The students make a choice from pool of electives offered by the department. The ESE is conducted for 50 marks.

Semester	Course Code	Course Title	Credit (s) Distribution (L,T,P,CL are hours/ week)				
			L	T	P	CL	CR
IV Semester	RES3241	Seminars in Respiratory Care	-	3	-	-	3
	RES3242	HealthCare Management and Law	3	-	-	-	3
VI Semester	RES3243	End of life issues & Bioethics	2	1	-	-	3
	RES3244	Registry Review	3	-	-	-	3

SEMESTER VII AND SEMESTER VIII

SEMESTER	COURSE	DURATION (hours/week= 48 hours)
VII	**Internship**	6 months
VIII *	**Internship / Externship***	6 months

Note:
* A student can opt for externship. Eligibility for externship is reflected in the guidelines.

At the end of Internship, an internal evaluation will be conducted out of 100 marks, which will be graded and reflected in the transcript.

Criteria for Externship (VIII SEMESTER)

Eligibility Criteria:

- The student should have a **CGPA > 8.5**
- If the students are eligible, the following document has to submit for screening.
  - Area of interest
  - Externship Institution details
  - Consent letter from the parents
  - Non-objection certificate (NOC) from the host institution/ from HOD of externship institution.

Externship duration will be for six months from January* – June (subject to change based on internship start date in the previous semester)

Externship Evaluation Criteria:

Assessment of the eligible students will be done under the following components of evaluation Rubric:

Evaluation Rubric:

EVALUATION COMPONENTS	POINTS
Clinical Evaluation (7th Semester)	**100**
Personal Interview: -Professional conduct -Communication -Diagnostic / Treatment skill -Time management and knowledge	**50**
Microteaching (on the area of interest)	**25**
Case presentation	**25**

In order to qualify for externship a student should score a minimum of 85%, i.e. 170 points out of 200points.

Total Credit Distribution

Semester	Credit Distribution					Marks Distribution		
	L	T	P	C	Total	IAC	ESE	Total
Semester - I	13	4	6	-	20	560	240	800
Semester - II	12	4	8	-	20	340	360	700
Semester - III	15	1	-	12	20	310	290	600
Semester - IV	09	1	-	21	20	360	240	600
Semester - V	06	2	2	24	20	250	150	400
Semester - VI	04	1	4	30	20	200	200	400
Semester - VII	-	-	-	48	NA	-	-	-
Semester - VIII	-	-	-	48	NA	-	-	-
Total	**59**	**13**	**20**	**183**	**120**	**2020**	**1480**	**3500**

SEMESTER - I

COURSE CODE		COURSE TITLE
ANA1101	:	Anatomy- I
ANA1112	:	Anatomy Practical- I
PHYS101	:	Physiology- I
RES1101	:	Clinical Anatomy and Physiology for Respiratory Care
BRES103	:	Medical Terminology
YGA1121	:	Yoga
EIC1001	:	Environmental Science & Indian Constitution
COMS102	:	Communication Skills

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Anatomy - I**
Course Code	**ANA1101**
Academic Year	First Year
Semester	I
Number of Credits	3
Course Prerequisite	Basic knowledge of biology
Course Synopsis	Human anatomy is the study of gross features and relations of various structures of the human body by dissection.

Course Outcomes (COs):
At the end of the course student shall be able to:

CO1	Explain the General Anatomy in the human body (C2)
CO2	Explain the Systemic Anatomy of the human body (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3								
CO4								
CO5								
CO6								

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours (Theory)**
Unit 1:		
General Anatomy	• Define the Anatomical position and Anatomical terms (C1) • Explain the epithelium – types and functions (C2) • Explain the connective tissue – fibers and cells (C2) • Explain the cartilage – types, structure and function (C2) • Explain the bone – types, structure and blood supply (C2) • Explain the muscle – classification, structure and function (C2) • Explain the neurons- types and structure, typical spinal nerve (C2) • Explain the blood vessels – arteries, veins, lymph vessels, lymph nodes, structure of lymph node (C2) • Explain the joints: Classification, examples , structure of a typical synovial joint (C2)	**7**

Content	Competencies	Number of Hours (Theory)
	• Explain the classification of synovial joints (C2)	
Unit 2:		
Respiratory system	• List the parts of respiratory tract (C1) • Explain the boundaries of the Nasal cavity (C2) • Explain the Lateral wall of nasal cavity - features, blood supply, nerve supply and lymphatic drainage (C2) • Explain the nasal septum: Formation, blood supply, nerve supply, lymphatic drainage and applied anatomy (C1, C2) • List and Explain the paranasal air sinuses and their function (C1, C2) • Explain the pharynx - extent, parts- nasopharynx , oropharynx and laryngopharynx - internal features (C2) • Explain the cavity of larynx, blood supply, nerve supply (C1, C2) • Explain the vocal cords and their movements, and Rima glottidis (C2) • List the intrinsic muscles of the larynx, their nerve supply and actions (C1) • List the Cartilaginous framework and ligaments (C1) • Explain the trachea: Extent, Structure and nerve supply (C2) • Explain the diaphragm - attachments, nerve supply and actions (C2) • Explain the thoracic cage: thoracic wall, intercostal spaces and their contents (C1, C2) • Explain the Lungs- gross anatomy, roots of the lungs, surface marking of pleura and lungs (C1, C2) • Explain the pleura- parts, pleural cavity, pleural recesses, pulmonary ligament (C2)	**5**
Unit 3:		
Cardiovascular system	• Explain the heart - position, external features, right atrium internal features (C1, C2) • Explain the right ventricle internal features, Blood supply to the heart (C1, C2) • Explain the left atrium and left ventricle, nerve supply of heart (C2) • Explain the pericardium - Parts, blood supply, nerve supply and function (C2) • Explain the mediastinum - boundaries and contents (C2) • List and explain the arteries - Arch of aorta and descending thoracic aorta (extent course and branches) (C1, C2) • Explain the veins -Azygos system of vein (formation, course and termination) (C1, C2)	**4**

Content	Competencies	Number of Hours (Theory)
	• Define the thoracic duct: formation, course and termination (C2) • Explain the arteries - pulmonary trunk, ascending aorta (extent course and branches) (C2) • Explain the veins - branchiocephalic veins, superior vena cava (formation, course and termination) (C2) • Explain the major arteries and veins of head and neck (name and positions) (C2) • Explain the major arteries and veins of abdomen and pelvis (name and positions) (C2) • Explain the abdominal aorta, inferior vena cava, portal vein (C1, C2)	
Unit 4:		
Digestive system	• List the parts of digestive system (C1) • Explain the tongue – gross anatomy, blood supply and nerve supply (C2) • Explain the salivary glands- Names and location (C2) • Explain the oesophagus- extent, parts, constrictions, blood supply, nerve supply and lymphatic drainage (C2) • Explain the stomach- position, relations, blood supply, nerve supply and lymphatic drainage (C1, C2) • Explain the duodenum- parts, important relations, blood supply and nerve supply (C2) • Explain the pancreas – position, parts, important relations, blood supply and nerve supply (C2) • Explain the small intestine – parts- duodenum, jejunum and ileum- blood supply and nerve supply (C1, C2) • Explain the large intestine – parts, position of each of the parts, extent, blood supply and nerve supply (C2) • List the differences between jejunum and ileum (C1) • List the differences between small intestine and large intestine (C1) • Explain the rectum and anal canal-position, blood supply, nerve supply and lymphatic drainage (C2) • Explain the liver- position, anatomical and physiological lobes, surfaces, relations, porta hepatis, blood supply and nerve supply (C1, C2) • Explain the extrahepatic biliary apparatus – gall bladder and bile duct (C2)	**6**
Unit 5:		
Urinary system	• List the parts of urinary system (C1) • Explain the kidneys: position, external features, capsules, relations, macroscopic structure, blood	**2**

Content	Competencies	Number of Hours (Theory)
	supply and nerve supply (C1, C2) • Explain the ureter- length, constrictions and blood supply (C2) • Explain the urinary bladder- position, external features, blood supply and nerve supply (C2) • Explain the urethra- female urethra, male urethra- parts (C2)	
Unit 6:		
Male reproductive system	• List the parts of male reproductive system (C1) • List the spermatic cord- constituents and coverings (C1) • Explain the testes- position, coverings, gross structure, blood supply, nerve supply and lymphatic drainage (C2) • Explain the vas deferens- commencement, course and termination (C2) • Explain the prostate – position, external features, lobes and structure (C2) • Explain the seminal vesicles and ejaculatory ducts (C2)	**2**
Unit 7:		
Female reproductive system	• Name the parts of female reproductive system (C1) • Explain the uterus-position, parts, external features, relations, blood supply and lymphatic drainage (C2) • Explain the uterine tube- parts, blood supply and nerve supply (C2) • Explain the ovary – position and structure (C2)	**2**
Unit 8:		
Endocrine glands	• Name the endocrine glands (C1) • Explain the pituitary gland (Hypophysis cerebri)- position, parts, blood supply (C2) • Explain the suprarenal glands- position, relations, parts, blood supply and lymphatic drainage (C2) • Explain the thyroid gland- position, parts, blood supply and lymphatic drainage (C2) • Name the parathyroid glands-their position and blood supply (C1)	**2**
Unit 9:		
Central Nervous system	• Name the parts of the CNS (C1) • List the features and explain the spinal cord- position, external features, internal structure, brief note on important ascending and descending tracts (C1, C2) • Explain the major motor and sensory pathways (C2) • Explain the pyramidal tract in detail (C2) • Name the parts of brain (C2) • List the external and internal features of medulla	**12**

Content	Competencies	Number of Hours (Theory)
	oblongata (C1) • List the cranial nerves attached to medulla oblongata (C1) • List the external and internal features pons (C1) • Explain the cranial nerves attached to pons and ponto-medullary junction (C2) • Explain the cerebellum- functional lobes of the cerebellum and its functions (C2) • Explain the midbrain- external features and internal structure – in brief (C1) • Explain the cranial nerves attached to midbrain (C2) • Explain the cerebral hemispheres – lobes, important sulci and functional areas (C2) • List the fiber system of the brain and explain the corpus callosum and internal capsule (C1, C2) • Explain the diencephalon- Thalamus and hypothalamus-position and functions (C2) • Explain the basal nuclei: Corpus striatum – parts and functions (C2) • Explain the blood supply to the central nervous system (C2) • Explain the ventricles: 4th and 3rd ventricles (features, position and communications) (C2) • Explain the lateral ventricles- parts, features, position and communications (C2) • Define the CSF production and circulation (C1)	
Unit 10:		
Special senses	• Recall the gross anatomy of the eye (C1) • Recall the gross anatomy of external, middle and internal ear (C1) • Recall the skin and its features (C1)	**3**

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	**45**	**135**
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**45**	**135**

Assessment Methods:							
Formative:		**Summative:**					
Unit Test		Sessional Exam I / Sessional Exam II (Theory)					
Quiz/ MCQ/MTF		End Semester Exam (Theory)					
Viva							
Assignments/Presentations							
Clinical assessment (OSCE, OSPE, WBPA)							
Clinical/Practical Log Book/ Record Book							
Mapping of Assessment with COs:							
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Sessional Examination 1		x	x				
Sessional Examination 2		x	x				
End Semester Exam		x	x				
Feedback Process:	Mid-Semester Feedback						
	End-Semester Feedback						
Main Reference:	1. Manipal Manual of Anatomy by Dr. Sampath Madhyastha						
Additional References	1. Human Anatomy by Dr. B. D. Chaurasia (Vol 1,2,3,4) 2. Chaurasia's handbook of human anatomy 3. Netter's Atlas						

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Anatomy Practical - I**
Course Code	**ANA1112**
Academic Year	First Year
Semester	I
Number of Credits	2
Course Prerequisite	Basic knowledge of general anatomy
Course Synopsis	Human anatomy is the study of gross features and relations of various structures of the body by dissection.

Course Outcomes (COs):
At the end of the course student shall be able to:

CO1	Identify and explain the General Anatomy in the human body (C1, P1)
CO2	Identify and explain the Systemic Anatomy of the human body (C2, P2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x						
CO2		x						
CO3								
CO4								
CO5								
CO6								

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
• Orientation about dissection hall, disciplines and precautionary measures to be taken during dissection sessions		
Unit 2:		
Respiratory system	• Identify the parts of respiratory tract (C1, P1) • Explain and identify the Nasal cavity under: (C2, P1) • Boundaries Lateral wall - features, blood supply, nerve supply and lymphatic drainage Nasal septum: Formation, blood supply, nerve supply, lymphatic drainage and applied anatomy Paranasal air sinuses and their function • Explain and identify the pharynx under - extent, parts- nasopharynx, oropharynx and laryngopharynx - internal features (C2, P1) • Explain and identify the larynx under: (C2, P1) Cartilaginous framework and ligaments, Cavity of larynx, blood supply, nerve supply	**12**

Content	Competencies	Number of Hours
	Vocal cords and their movements Rima glottidis Names of the intrinsic muscles of the larynx, their nerve supply and actions • Explain and identify the thoracic cage: thoracic wall, intercostal spaces and their contents (C2, P1) • Explain and identify the mediastinum - boundaries and contents (C2, P1) • Explain and identify the diaphragm - attachments, nerve supply and actions (C2, P1) • Explain and identify the trachea: Extent, Structure and nerve supply (C2, P1) • Define and identify the pleura- parts, pleural cavity, pleural recesses, pulmonary ligament (C1, P1) • Explain and identify the lungs- gross anatomy, roots of the lungs, surface marking of pleura and lungs (C2, P1)	
Unit 3:		
Cardiovascular system	• Explain and identify the pericardium – parts, blood supply, nerve supply and function (C2, P1) • Explain and identify heart – position, external features (C2, P2) • Explain and identify right atrium, left atrium, right ventricle & left ventricle- internal features (C2, P2) • Explain and identify blood supply to the heart and nerve supply of heart (C2, P2) • Vessels • Explain and identify the arteries – Arch of aorta, pulmonary trunk, ascending aorta and descending thoracic aorta (extent course and branches) (C1, P1) • Explain and identify the major arteries and veins of head and neck (name and positions) (C1, P1) • Explain and identify the major arteries and veins of abdomen and pelvis (name and positions) (C1, P1) • Explain and identify the abdominal aorta- (extent course and branches) (C1, P1) • Explain and identify the veins –Azygos system of vein, branchiocephalic veins, superior vena cava, inferior vena cava, portal vein (formation, course and termination) (C1, P1) • Explain and identify the thoracic duct: formation, course and termination (C1, P1)	**4**
Unit 4:		
Digestive system	• Explain and identify the tongue – gross anatomy, blood supply and nerve supply (C1, P1) • Explain and identify the salivary glands: Location (C1, P1) • Explain and identify the oesophagus- extent, parts, constrictions, blood supply, nerve supply and lymphatic drainage (C1, P1) • Explain and identify the stomach- position, relations,	**4**

Content	Competencies	Number of Hours
	blood supply, nerve supply and lymphatic drainage (C1, P1) • Explain and identify the small intestine – parts- duodenum, jejunum and ileum- blood supply and nerve supply (C1, P1) • Explain and identify the duodenum- parts, important relations, blood supply and nerve supply (C1, P1) • Explain and identify the large intestine – parts, position of each of the parts, extent, blood supply and nerve supply (C1, P1) • List the differences between jejunum and ileum (C1, P1) • List the differences between small intestine and large intestine (C1, P1) • Explain and identify the rectum and anal canal-position, blood supply, nerve supply and lymphatic drainage (C1, P1) • Explain and identify the pancreas – position, parts, important relations, blood supply and nerve supply (C1, P1) • Explain and identify the liver- position, anatomical and physiological lobes, surfaces, relations, porta hepatis, blood supply and nerve supply (C1, P1) • Explain and identify the extrahepatic biliary apparatus – gall bladder and bile duct (C1, P1)	
Unit 5:		
Urinary system	• Explain and identify the kidneys: position, external features, capsules, relations, macroscopic structure, blood supply and nerve supply (C1, P1) • Explain and identify the ureter- length, constrictions and blood supply (C1, P1) • Explain and identify the urinary bladder- position, external features, blood supply and nerve supply (C1, P1) • Explain and identify the urethra- female urethra, male urethra- parts (C1, P1)	**2**
Unit 6:		
Male reproductive system	• Explain and identify the spermatic cord- constituents and coverings (C1, P1) • Explain and identify the testes- position, coverings, gross structure, blood supply, nerve supply and lymphatic drainage (C1, P1) • Explain and identify the vas deferens- commencement, course and termination (C1,P1) • Explain and identify the prostate – position, external features, lobes and structure (C1,P1) • Seminal vesicles and ejaculatory ducts (C1,P1)	**2**
Unit 7:		
Female reproductive	• Explain and identify the uterus-position, parts, external features, relations, blood supply and lymphatic drainage	**2**

Content	Competencies	Number of Hours
system	(C1,P1) • Explain and identify the uterine tube- parts, blood supply and nerve supply (C1,P1) • Explain and identify the ovary – position and structure (C1,P1)	
Unit 8:		
Endocrine glands	• Explain and identify the pituitary gland (Hypophysis cerebri)-position, parts, blood supply (C1,P1) • Explain and identify the suprarenal glands- position, relations, parts, blood supply and lymphatic drainage (C1, P1) • Explain and identify the thyroid gland- position, parts, blood supply and lymphatic drainage (C1, P1) • Explain and identify the parathyroid glands-position and blood supply (C1, P1)	**2**
Unit 9:		
Central Nervous system	• Introduction to CNS (C1) • Explain and identify the spinal cord- position, external features, internal structure, brief note on important ascending and descending tracts (C1, P1) • Explain and identify the pyramidal tract in detail (C1,P1) • Naming the parts of brain (C1, P1) • Explain and identify the external and internal features of medulla oblongata (C1, P1) • Explain and identify the cranial nerves attached to medulla oblongata (C1, P1) • Explain and identify the external and internal features pons (C1, P1) • Explain and identify the cranial nerves attached to pons and pontomedullary junction (C1, P1) • Explain and identify the cerebellum- functional lobes of the cerebellum and its functions (C1, P1) • Explain and identify the midbrain- external features and internal structure – in brief (C1, P1) • Explain and identify the cranial nerves attached to midbrain (C1, P1) • Explain and identify the cerebral hemispheres – lobes, important sulci and functional areas (C1, P1) • Explain and identify the fiber system of the brain – corpus callosum and internal capsule (C1,P1) • Explain and identify the diencephalon- Thalamus and hypothalamus-position and functions (C1, P1) • Explain and identify the basal nuclei: Corpus striatum – parts and functions (C1, P1) • Explain and identify the ventricles: 4th and 3rd ventricles (features, position and communications) (C1, P1) • Explain and identify the lateral ventricles- parts, features, position and communications (C1, P1)	**12**

Content	Competencies	Number of Hours
	• Explain and identify the CSF production and circulation (C1, P1) • Explain and identify the blood supply to the central nervous system (C1, P1)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical (02 hrs each)	40	120
Revision	04	12
Assessment	03	09
Total	**47**	**141**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	
Quiz/ Spotters	End Semester Exam Practical
Viva	Viva
Assignments/Presentations	
Clinical assessment (OSCE, OSPE, WBPA)	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x	x				
Quiz / Viva	x	x				
Assignments/Presentations						
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x				

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Manipal Manual of Anatomy by Dr. Sampath Madhyastha
Additional References	1. Human Anatomy by Dr. B. D. Chaurasia (Vol 1,2,3,4) 2. Chaurasia'a handbook of General Anatomy 3. Netter's Atlas

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Physiology I**
Course Code	**PHY1101**
Academic Year	First year
Semester	1
Number of Credits	2
Course Prerequisite	Basic knowledge of biology
Course Synopsis	This module provides a comprehensive knowledge about normal functions of the organ systems of the body to understand the physiological basis of health and disease required for health professional (paramedical) courses.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Know the basic facts and concepts of Physiology (C1)
CO2	Explain the normal functions of various systems of the body.(C2)
CO3	Describe the relative contribution of various systems in maintaining the homeostasis.(C2)
CO4	Explain the physiological basis of disease processes.(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1. BASIC CONCEPTS AND NERVE PHYSIOLOGY		
Transport across cell membrane	• Name the various transport mechanisms across cell membrane(C1) • Describe passive transport mechanisms such as simple diffusion, facilitated diffusion and osmosis (C2) • Describe primary and secondary active transport mechanisms(C2)	4
Body fluid compartments	• Mention the total body water as percentage of body weight and its distribution. (C1) • Give the ionic composition of body fluids(C1)	
Physiology of neuron	• Describe the morphology of a neuron (C2) • Mention the structure and functions of myelinated and unmyelinated nerve fibers (C2)	
Membrane potential	• Describe resting membrane potential(C2) • Draw and label the action potential (C2)	

Content	Competencies	Number of Hours
	• Describe the ionic basis of the action potential (C2)	
Unit 2: MUSCLE PHYSIOLOGY		
Skeletal muscle	• Describe the characteristic features of skeletal, cardiac and smooth muscles(C2) • Describe the structure of skeletal muscles(C2) • Mention the types of skeletal muscles(C1) • Explain neuromuscular transmission in skeletal muscle(C2) • Explain excitation contraction coupling in skeletal muscle(C2) • Describe rigor mortis (C2)	4
Smooth muscle	• Mention the types of smooth muscle(C1)	
Unit 3: BLOOD		
Composition and functions of blood	• Describe the composition of blood(C2) • List the functions of blood(C1)	6
Plasma proteins	• Name the different types of plasma proteins (C1) • List the functions of plasma proteins(C1)	
Red blood cells	• Mention the morphology and functions of red blood cells (C1) • Mention the normal count of RBC and its variations (C1) • Describe the stages and factors influencing erythropoiesis(C2) • Mention the normal value of hemoglobin concentration and its variations(C1) • Mention the functions of hemoglobin (C1) • Define anemia(C1)	
White blood cells	• Classify White Blood Cells (WBC) (C2) • List the functions of WBCs(C1) • Mention the normal count of various types of WBCs (C1)	
Hemostasis	• Mention the normal range of platelets and its variations(C1) • List the functions of platelets(C1) • Define hemostasis(C1) • Describe the various stages involved in haemostasis (C2) • List the clotting factors(C1) • Describe the intrinsic and extrinsic pathways of coagulation (C2) • Describe hemophilia(C2) • Classify anticoagulants and give examples for each(C2)	
Blood types/groups	• Describe the ABO and Rh systems of blood grouping(C2) • Explain the importance of blood grouping(C2)	

Content	Competencies	Number of Hours
	• Mention the hazards of blood transfusion(C1) • Explain the cause and clinical features of hemolytic disease of the newborn (erythroblastosis fetalis) (C2)	
Lymph	• List the functions of lymph(C1)	
Unit 4: CARDIOVASCULAR SYSTEM		
Organization of cardiovascular system	• Describe the structure of heart (C2) • Describe the innervation of heart and blood vessels(C2) • Describe the properties of cardiac muscle(C2)	9
Cardiac cycle	• Define cardiac cycle (C1) • State the normal duration of cardiac cycle (C1) • Explain the various events occurring during a cardiac cycle with the help of graphs(C2)	
Heart sounds	• Enumerate the differences between first and second heart sounds(C2)	
Electrocardiogram (ECG)	• Define electrocardiogram (ECG) (C1) • Draw a labeled diagram of a normal ECG recorded from limb lead II (C1) • Describe the waves and intervals of ECG (C2) • Mention the uses of ECG(C1)	
Heart rate	• Mention the normal value and variations of heart rate(C1) • Describe the regulation of heart rate(C2)	
Cardiac output	• Define cardiac output (C1) • State the normal value of cardiac output (C1) • Mention the variations of cardiac output(C1) • Describe the regulation of cardiac output(C2) • Mention the effect of muscular exercise on cardiac output (C1)	
Blood pressure (BP)	• Define blood pressure (BP) (C1) • Mention the normal value of BP (C1) • Mention the factors influencing BP(C1) • Mention the variations of blood pressure(C1) • Describe the short term regulation of arterial blood pressure(C2)	
Unit 5: RESPIRATORY SYSTEM		
Introduction to respiration	• Describe the functional anatomy of the respiratory system (C2)	6
Mechanics of respiration	• Mention the muscles of respiration(C1) • Describe the mechanism of inspiration and expiration(C2) • Describe the intra-pulmonary and intra-pleural pressure changes during the various phases of respiration(C2)	
Lung volumes and capacities	• Draw a labelled spirogram(C2) • Define various lung volumes and capacities (C1)	

Content	Competencies	Number of Hours
	• Mention the normal values of lung volumes and capacities (C1)	
Ventilation	• Define pulmonary ventilation (C1) • Mention the normal value of pulmonary ventilation (C1) • Define alveolar ventilation(C1) • Mention the normal value of alveolar ventilation(C1) • Define anatomical dead space (C1) • Mention the normal value of anatomical dead space (C1)	
Gas exchange	• Describe the structure of respiratory membrane (C2) • Mention the factors affecting diffusion of gases across it (C1)	
Transport of gases	• Mention the forms in which oxygen is transported in the blood(C1) • Describe the oxygen-hemoglobin dissociation curve(C2) • Mention the factors shifting the oxygen-hemoglobin dissociation curve to the right and to the left(C1) • Mention the forms in which carbon dioxide is transported in the blood(C1) • Describe the mechanism of carbon dioxide transport(C2)	
Regulation of respiration	• Explain the neural regulation of respiration(C2) • Explain the chemical regulation of respiration(C2)	
Applied aspects	• Define hypoxia(C1) • Mention the types of hypoxia with example (C1) • Define cyanosis(C1) • Mention the cause of cyanosis (C1) • Mention the types of hypoxia in which cyanosis occurs (C2) • Define apnea, dyspnea and asphyxia(C1)	
Unit 6: SPECIAL SENSES		
Vision	• Describe the structure of human eye with the help of a diagram (C2) • Mention the functions of aqueous humor (C1) • Name the photoreceptors (C1) • Mention the differences between the rods and cones (C1) • Draw the visual pathway (C2) • Explain the defects in field of vision due to lesions of visual pathway at different locations (C2) • Describe the mechanism of accommodation(C2) • Describe light reflex with the help of a diagram (C2) • Define visual acuity and mention the tests (C2) • Describe the cause and correction for refractory errors of the eye(C2)	4

Content	Competencies	Number of Hours
Hearing and vestibular apparatus	• Describe the structure and functions of external, middle and inner ear (C2) • Describe the mechanism of hearing (C2) • Mention the parts and functions of vestibular apparatus (C1)	
Taste and smell	• Name the receptors for taste and smell (C1) • Mention the disorders of taste and smell (C1)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	33	99
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**33**	**99**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	
Assignments/Presentations	
Clinical assessment (OSCE, OSPE, WBPA)	
Clinical/Practical Log Book/ Record Book	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x	x	x	x		
Sessional Examination 2	x	x	x	x		
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Basics of Medical Physiology,4th edition, D.Venkatesh, H.H.Sudhakar 2. Manipal Manual of Medical Physiology,1st edition, C. N. ChandraShekar

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Yoga**
Course Code	**YGA1121**
Academic Year	First Year
Semester	I
Number of Credits	2
Course Prerequisite	Nil
Course Synopsis	The students will learn about 1. Importance of yoga and ashtanga yoga. 2. Significance of asanas and pranayama on improving the respiratory physiology.

Course Outcomes (COs):
At the end of the course student shall be able to:

CO1	Describe the history of yoga.(C1)
CO2	Explain the effects Yoga on the respiratory system.(C2)
CO3	Perform different Asana techniques to improve respiratory physiology.(P5)
CO4	Perform different pranayama techniques to improve respiratory physiology.(P5)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2			x		x			
CO3				x			x	
CO4		x						x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**	
		Lecture	**Practical**
Unit 1:			
Introduction to Yoga	1. Define Yoga.(C1) 2. Explain the word meaning, concepts, misconcepts, history of yoga and literature.(C2) 3. Explain and understand about Ashtanga Yoga.(C2)	4	-
Unit 2:			
Yoga and respiratory system	1. Explain the effects of yoga techniques on respiratory system.(C2) 2. Explain the effects of yoga techniques on respiratory disorders.(C2)	4	-

Content	Competencies	Number of Hours	
		Lecture	Practical
Unit 3:			
Asanas to improve respiratory functions	1. Perform the following asanas as per the direction(P5) • Swatikasana • Vajrasana • Suptvajrasana • Urdhwavajrasana • Trikonasana • Parshvakonasana • Parshvottanasana • Pashimotanasana • Purvottanasana • Marichasana 1 • Marichasana 3 • Pavanamuktasana • Bhujangasana • Shalabasana • Dhanurasana • Paryankasana • Ustrasana • Uttanapadasana • Padottanasana • Gomukhasana • Vakrasana • Sarvangasana • Bhradwajasana • Ardhamatseyendrasana • Shavasana 0 • Shavasana 1 • Shavasana 2	-	14
Unit 4:			
Pranayama to improve respiratory function	1. Perform and understand different pranayama techniques as follows:(P5) • AnulomaViloma Pranayama • Suryabhedana Pranayama • Bhastrika Pranayama • Ujjayee Pranayama • Bhramari Pranayama • Meditation	-	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	08	24
Seminar		
Small group discussion (SGD)		

Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical	18	-
Revision		
Assessment		--
Total	**26**	**24**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam
Quiz	-
Viva	-
Clinical/Practical Log Book/ Record Book	-

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**-**
Mid Semester Examination	x	x			-
Clinical/Practical Log Book/ Record Book	x	x	x	x	-
Any others: WPBA					-
End Semester Exam	-	-	-	-	-

Feedback Process:	Mid-Semester Feedback
Main Reference:	1) Gore MM. Anatomy and physiology of yogic practices. Kanchan Prakashan; 1991. ISBN- 9788178223056
Additional References	1) Iyengar BK. Light on the yoga sutras of Patanjali. Aquarian/Thorsons; 1993. *ISBN*-10: 9788172235420

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Environmental Science**
Course Code	**EIC1001**
Academic Year	First Year
Semester	I
Number of Credits	1
Course Prerequisite	Nil
Course Synopsis	1. Aim to give students a general understanding of environmental science and introduce them to some of the main principles 2. It covers the study of subjects for example understanding of earth procedures, evaluating alternative energy frameworks, mitigation and pollution control, natural resource management, effects of global climate change and so on

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the role of Environmental Science, its multidisciplinary nature in conservation of global environment (C2)
CO2	Describe the natural resources, utility and the role of ecosystems in maintaining planetary cycles (C2)
CO3	Outline the types, sources, prevention and control measures of pollution (C2)
CO4	List the laws, acts and policies related to environmental protection in India (C1)
CO5	Explain the types, mitigation and management techniques of disaster (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2	x			x				
CO3	x					x		
CO4			x				x	
CO5			x			x		

Content	**Competencies**	**Number of Hours**
Unit 1:		
Environmental Studies and multi-disciplinary nature	1. Explain the meaning, objectives and major environmental issues (C2) 2. What is sustainable development? (C1) 3. Explain the global environmental concerns (C2)	2
Unit 2:		
Biodiversity, Ecosystem, Energy and natural resources	1. Classify the natural resources (C2) 2. List the renewable and non- renewable resources (C1)	4

Content	Competencies	Number of Hours
	3. Outline the consumption of renewable and non-renewable resources 4. Explain the conservation methods of renewable and non-renewable resources 5. Outline the availability of water resources, forest, land and mineral resources. 6. Summarize the different types of energy (C2) (Conventional sources & Non-Conventional sources of energy, solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas, Fossil Fuels, Hydrogen as an alternative energy) 7. Define Ecosystem (C1) 8. Explain the meaning, structure and functions of ecosystem (C2) 9. Explain the biotic and abiotic components of ecosystem (C2) 10. Describe the trophic levels in ecosystem (C2) 11. What is an energy flow in an ecosystem (C1) 12. Explain Biodiversity and its conservation (C2) (in situ & ex situ, IUCN red list)	
Unit 3:		
Environmental Pollution	1. Explain the various types of Environmental Pollution (C2) (water, air, land, noise, solid waste, Biomedical waste, nuclear pollution, marine pollution)	2
Unit 4:		
Environmental laws and legislations	1. Outline the environmental laws and legislations (C2) (Related to general, air, water, biodiversity and forests) 2. Explain the roles and responsibilities of state and central Pollution control Boards (C2) 3. What is Environmental impact assessment (EIA) (C1)	2
Unit 5:		
Disaster management	1. Define disaster (C1) 2. What is disaster management? (C1) 3. Classify the types of disaster (C2) 4. What is disaster risk formula (C1) 5. Explain the phases in Disaster management phases (C2) (Disaster management cycle, Emergency response and recovery, Hazardous waste spills and dangers posed)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	13	39
Seminar	-	
Small group discussion (SGD)	-	
Self-directed learning (SDL)	-	
Problem Based Learning (PBL)	-	
Case Based Learning (CBL)	-	
Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**13**	**39**

Assessment Methods:	
Formative:	**Summative:**
Assignments	Mid Semester/Sessional Exam (Theory)

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Assignments			x	x	x
Mid Semester / Sessional Examination	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Benny Joseph, Environmental Studies, Tata McGraw-Hill Publishing Company Ltd., New Delhi (2008). 2. Aloka Debi, “Environmental Science and Engineering”, Universities Press (India) Pvt. Ltd. (2012).
Additional References	1. Mohan kanda, Disaster Management in India evolution of institutional arrangements & operational strategies. (2017) 2. Student guide: Environment Reader for Universities, based on UGC syllabus published by Centre for Science and Environment, (2017). 3. G.Swarajya Lakshmi, Environmental science: A Practical Manual, (2010).

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Indian Constitution**
Course Code	**EIC1001**
Academic Year	First Year
Semester	1
Number of Credits	1
Course Prerequisite	Nil
Course Synopsis	1. To provide understanding of knowledge of the Indian constitution. 2. To familiarize students with the fundamental rights and duties. 3. To understand the importance of constitutional laws. 4. To understand the correlation between Indian constitution, democracy and society.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the salient features, importance and need of the Constitution (C2)
CO2	Infer the need of fundamental rights in a democratic system for a holistic development of a society (C2)
CO3	Outline the directions given to the state by the constitution and fundamental duties of a citizen towards the state (C2)
CO4	Explain the working nature of State and Centre, roles and responsibilities of President and Governors, amendments emergency powers enjoyed by the government (C2)
CO5	Explain various laws listed under IPC and CrPC and understand importance of voting in a democracy and RTI (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2				x	x			
CO3			x				x	
CO4						x		x
CO5				x			x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Introduction to Indian Constitution	1. Outline the evolution of the Legal System (C1) (pre-colonial and colonial times, Common Law, Civil Law and Socialist Legal System) 2. Explain the constitutional history and constitutional assembly (C2)	3

Content	Competencies	Number of Hours
	3. Explain the various organs of the Government (C2) (Executive, Legislature and Judiciary, and Panchayat institutions) 4. Summarise the functions of high court and supreme court of India (C2)	
Unit 2:		
Fundamental Rights	1. Explain the individual rights and fundamental rights (C2) 2. Outline the history of the demand for fundamental rights (C2) 3. Classify the fundamental rights (C2) 4. Explain how fundamental rights are a guarantee against state action (C2) 5. Summarise Article 14 to Article 30 (C2) 6. Explain supreme court as the guardian of Fundamental Rights (C2)	4
Unit 3:		
Fundamental Duties and Directive Principles of State Policy	1. Explain fundamental duties and its enforcement (C2) 2. Summarise the utility and the scope of DPSP(C2) 3. Outline the socialistic pattern of society (C2) 4. Explain the conflict between fundamental rights and DPSP (C2)	3
Unit 4:		
Role of President and Governors/ Cabinet	1. What is the procedure followed while electing a President (C1) 2. Explain the power and duties of the President (C2) 3. Outline the power and duties of the Governors (C2) 4. Explain the role and functions of the council of Ministers (C2)	2
Unit 5:		
Role of citizens, Constitutional laws(IPC and CrPC), RTI	1. Explain the role of citizens in a democracy (C2) 2. Explain constitutional laws (C2) 3. Explain the Indian Penal Code and Code of Criminal Procedure (C2) 4. Summarise right to Information (C2)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):

Learning Strategies	Contact Hours	Student Learning Time (SLT)
Lecture	15	45
Seminar	-	
Small group discussion (SGD)	-	
Self-directed learning (SDL)	-	
Problem Based Learning (PBL)	-	
Case Based Learning (CBL)	-	

Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**15**	**45**

Assessment Methods:	
Formative:	**Summative:**
Assignments	Mid Semester/Sessional Exam (Theory)

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Assignments		x		x	x
Mid Semester / Sessional Examination	x	x	x		

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Subhash C**.** Kashyap, Our Constitution**,** National Book Trust. (2011) 2. P. M. Bhakshi. The Constitutution of India. Universal Law Publishing.(2017)
Additional References	1. Dr. B. R. Ambedkar. The Constitution of India. Educreation Publishing. (2020) 2. Bipan Chandra.History of Modern India. Orient BlackSwan. (2009) 3. Dr. Durga Das Basu. Introduction to the Constitution of India. Lexis Nexis.(2013)

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Communication Skills**
Course Code	**CSK1001**
Academic Year	First Year
Semester	I
Number of Credits	2
Course Prerequisite	Nil
Course Synopsis	1. Equips the students with primary oral and written communication skills in English. 2. Orients students to focus on diverse interactive situations and enhances the interpersonal skills required in a professional environment.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Identify the components of communication skills and apply them in a professional setting (C3)
CO2	Outline effective oral communication skills in diverse context (C2)
CO3	Summarize different ways to write creatively, coherently and effectively on a given topic (C2)
CO4	Develop active listening skills involving feedback in diverse interactive situation. (C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1					x		x	
CO2					x		x	
CO3		x					x	
CO4			x				x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Communication Skills	1. Define Communication (C1) 2. Outline the process and barriers in Communication (C2) 3. Explain the types of communication (C2) (Oral, Verbal, non-verbal, dyadic) 4. How to improve spoken skills (C1)(Telephone, face – to- face) 5. How to improve communication (C1) 6. Apply the concepts of communication skills in a professional setting (C3) 7. Identify the difference between formal and informal communication (C3)	6

Content	Competencies	Number of Hours
Unit 2:		
Reading Skills	1. Explain the types of reading (C2) (Oral, Silent, Extensive, Scanning, Skimming) 2. Outline the reading techniques (C2) (3Q3R) 3. What is the difference between scanning and skimming(C1) 4. Define source of information (C1) 5. Explain feedback on LSWR in individual presentation (C2) 6. Summarise the role played by prepositions in understanding what to read (C2)	4
Unit 3:		
Listening Skills	1. Explain the types of listening (C2) 2. Summarize the context and purpose of listening (C2) 3. Explain various types of listening obstacles (C2) 4. How to improve hearing and focused listening (C1) 5. What is facilitating understanding, static & process description-gambits (C1)	8
Unit 4:		
Writing skills	1. What is the difference between spoken and written form (C1) 2. How words are formed into phrases & clauses (C1) 3. Outline writing paragraphs, cohesion, coherence (C2) 4. Explain summary, precise and essay writing (C2) 5. How to write a formal and informal letters (C1) 6. How to write a resume /CV(C1) 7. Explain the role of visual aids and meetings in writing (C2) 8. Explain the importance of abbreviations and punctuations in writing(C2)	8

Learning Strategies, Contact Hours and Student Learning Time (SLT):

Learning Strategies	Contact Hours	Student Learning Time (SLT)
Lecture	26	78
Seminar	-	
Small group discussion (SGD)	-	
Self-directed learning (SDL)	-	
Problem Based Learning (PBL)	-	
Case Based Learning (CBL)	-	
Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**26**	**78**

Assessment Methods:					
Formative:	**Summative:**				
Assignments	Mid Semester/Sessional Exam (Theory)				
Mapping of Assessment with COs:					
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**
Assignments		x	x	x	
Mid Semester / Sessional Examination		x	x	x	x
Feedback Process:	Mid-Semester Feedback				
	End-Semester Feedback				
Main Reference:	1. Jain, A K & et al., (2008-5th Edition). *Professional Communication Skills*, 2008, New Delhi, S Chand and Company 2. Raman, M., & Singh, P. (2012). *Business communication*. New Delhi: Oxford University Press				
Additional References	1. Raman, M & Sharma, S (2014). *Technical communication: Principles and Practice.* New Delhi: Oxford University				

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical Anatomy and physiology for respiratory care**
Course Code	**RES1101**
Academic Year	First Year
Semester	1
Number of Credits	4
Course Prerequisite	Student should have basic knowledge about the anatomy and physiology of respiratory and cardiovascular systems.
Course Synopsis	1.This module helps to familiarize and understand the basic fundamentals of anatomy and physiology that will aid for respiratory care practise 2.To understand the various functions of cardiopulmonary systems 3.To understand and the explain effects of various factors on cardiopulmonary system

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Define the basic concepts of cardiopulmonary anatomy and physiology(C1)
CO2	Explain the anatomy and physiology of cardiopulmonary system(C2)
CO3	Explain the different functions of cardiopulmonary systems(C2)
CO4	Summarize the effects of various factors on cardiopulmonary system (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x		x					
CO2				x		x		
CO3		x			x			
CO4							x	x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**	
		Lecture	**Tutorial**
Unit 1:			
Anatomy and physiology of the Respiratory system	1) Define external and internal respiration(C1) 2) Explain the anatomy of Respiratory system in details.(C2) 3) Define bucket handle and pump handle movement (C1) 4) Explain the primary and accessory muscles of breathing.(C2) 5) Explain how the pulmonary and bronchial circulations are	2 hours	2 hour

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	organized and their functions(C2) 6 Explain how the lungs are organized into lobes and segments and the airways that supply them with ventilation(C2)		
Unit 2:			
Ventilation	1) Define tidal volume (C1) 2) Explain the different pressure gradient's(C2) 3) Define compliance, resistance Time constant (C1) 4) Explain the mechanics of spontaneous ventilation(C2) 5) Explain the mechanics of exhalation(C2) 6) Explain the types of work of breathing(C2) 7) Explain different types of dead space (C2) 8) Define VD/VT ratio(C1) 9) Explain alveolar ventilation(C2)	2 hours	2hour
Unit 3:			
Pulmonary Function Measurement	1) Explain a normal spirogram.(C2) 2) Define the different lung volumes and capacities(C1) 3) Explain the test done on spirometry(C2) 4) Define Maximum voluntary ventilation(C1) 5) Explain the calibration technique in pulmonary function test(C2) 6) Explain nitrogen washout, helium dilution technique (C2) 7) Explain plethysmography(C2) 8) Explain diffusion capacity test (C2)	2 hours	
Unit 4 :			
Diffusion of pulmonary gases	1) Define external and internal respiration(C1) 2) Explain diffusion of gases across the membrane(C2) 3) Define Fick's law of diffusion(C1) 4) Explain alveolar air equation(C2) 5) Define Daltons Law of partial pressure(C1) 6) Define Grahams Law of diffusion(C1) 7) Explain the changes in partial	2 hours	1 hours

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	pressure of oxygen and carbon dioxide(C2)		
Unit : 5			
Anatomy and physiology circulatory system	1) Explain the anatomy of the heart(C2) 2) Explain the properties of heart muscle (C2) 3) Explain the vascular system (C2) 4) Define systemic vascular resistance, Mean arterial pressure, pulmonary vascular resistance and cardiac output (C1) 5) Explain the factors which affect heart rate (C2) 6) Explain the control of cardiovascular system(C2) 7) Explain the cardiac cycle(C2)	2 hours	2hours
Unit : 6			
Oxygen and carbon dioxide transport	1) Explain the oxygen transport (C2) 2) Explain the oxyheamoglobin dissociation curve with a diagram(C2) 3) Explain carbon dioxide transport(C2) 4) Define oxygen content, oxygen saturation(C1) 5) Explain the normal loading and unloading of oxygen(C2) 6) Define Fick's equation, Bohr's equation(C1) 7) Explain the factors that affect the oxyheamoglobin dissociation curve(C2) 8) Define metheamoglobin, Fetalhaemoglobin,and carboxyheamoglobin (C1) 9) Explain the reasons of inadequate minute ventilation(C2)	2 hours	2hours
Unit :7			
Acid Base Balance and Regulation	1) Define acid base balance(C1) 2) Explain buffer system(C2) 3) Explain Henderson's Hassel Balch Equation(C2) 4) Explain Normal acid base balance.(C2) 5) Explain respiratory acidosis, alkalosis, metabolic acidosis and	2 hours	2 hours

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	alkalosis(C2) 6) Explain the steps of interpretation of acid base balance. (C2)		
Unit: 8			
Ventilation and perfusion relationship	1) Explain the relationship of ventilation perfusion (C2) 2) Explain the factors which increase or decrease V/Q ratio(C2)	2 hours	1 hour
Unit:9			
Control of ventilation	1) Explain the different respiratory centres of the brain (C2) 2) Explain the regulation of Respiration(C2) 3) List and explain the different reflexes which affect ventilation(C1,C2) 4) Explain the chemical control of breathing(C2) 5) Explain control of breathing in chronic hypercapnia.(C2) 6) Explain the ventilator response to exercise(C2) 7) Define cheyne stokes respiration, Biots respiration, apneustic breathing.(C1)	2 hours	1 hour
Unit:10			
Aging and cardiopulmonary system	1) Explain the effects of increased age on cardiopulmonary system(C2)	-	1 hour
Unit:11			
Electrophysiology of the heart	1) Explain the conduction system of the heart(C2) 2) Explain the different pacemaker sites (C2) 3) Explain a normal ECG with a diagram (C2)	-	2 hours
Unit:12			
The standard 12 leads ECG	1) Explain the various positions in taking a 12 limb lead ECG and its significance(C2)	2 hours	
Unit :13			
ECG interpretation	1) Explain the steps of interpretation of ECG.(C2) 2) Explain the classification of abnormal ECG and normal ECG.(C2)	2 hours	I hour

Content	Competencies	Number of Hours	
		Lecture	Tutorial
Unit: 14			
Haemodynamic measurements	1) Explain the ways of haemodynamic measurement (C2) 2) Explain the significance of haemodynamic monitoring(C2)	2 hours	1 hour
Unit:15:			
Renal failure and its effect on cardiopulmonary	1) Explain the effects of renal failure on cardiopulmonary system.(C2) 2) Define Glomerular filtration rate(C1) 3) Explain the functions of kidney(C2)	2 hours	2 hours
Unit :16			
Sleep physiology and its relationship to the cardiopulmonary system	1) Explain the physiology of sleep(C2) 2) What are the effects of sleep on cardiopulmonary system(C1) 3) Explain the Management of sleep (C2)	-	2 hours
Unit:17			
Exercise and its effect on the cardiopulmonary	1) Explain the effects of exercise on respiration(C2) 2) Explain the effects of exercise on circulatory system(C2)		1 hour
Unit:18			
High altitude and its effects on the cardiopulmonary systems	1) Explain the various effects of high altitude on cardiopulmonary system (C2)		1 hour
Unit:19			
High pressure environment and their effects on the cardiopulmonary systems	1) Explain the effects of high pressure environment on respiratory system(C2) 2) Explain the effects of high pressure environment on cardiovascular system (C2)		2 hours

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)	14	28
Self-directed learning (SDL)	12	24
Problem Based Learning (PBL)		

Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**52**	**104**

Assessment Methods	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	-
Assignments/Presentations	-

Mapping of Assessment with COs:

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester Examination 1	x	x		
Quiz / Viva	x	x	x	x
Assignments/Presentations	x	x	x	x
End Semester Exam	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Cardiopulmonary Anatomy and Physiology, Essentials of respiratory care by Terry R, Des Jardins 6th Edition Mosby publication, *ISBN*-10: 0840022611; 2. Egans Fundamentals of Respiratory care 12th Edition, *ISBN* 9780323511124
Additional References	1. Manipal manual of anatomy for allied health sciences,3rd edition, *ISBN*-10: 9788123929682
	2. Basics of Medical physiology ,H.H Sudhakar, 3rd edition ISBN-13; 9788184739183

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Medical Terminology**
Course Code	**RES1102**
Academic Year	First Year
Semester	I
Number of Credits	3
Course Prerequisite	Nul
Course Synopsis	1. This module helps to familiarize and recognize the medical terms. 2. To provide fundamental knowledge in medical terminologies. 3. To identify and explain the medical terminologies according to the specific system of human body.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the techniques of medical word-building using basic word elements (C2)
CO2	Pronounce medical terms presented in each chapter. (C2)
CO3	Identify and organise the medical terms according to each body system. (C3)
CO4	Recognize the medical term and interpret the patient condition (C1)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2			x		x			
CO3						x		x
CO4				x			x	

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**	
		Lecture	**Tutorial**
Unit 1:			
Basic Elements of a Medical Word	1. Identify the four word elements used to build medical words. (C3) 2. Organise medical words into their component parts. (C3) 3. Apply the basic rules to define and build medical words.(C3) 4. Make use of the pronunciation guidelines chart and interpret pronunciation marks. (C3) Identify the medical terms presented in this chapter.(C3)	1 hour	2 hour
Unit 2:			
Suffixes	1. Define and provide examples of surgical, diagnostic pathological, and	1 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	related suffixes.(C1) 2. Relate combining forms and word roots to suffixes.(C2) 3. Identify surgical, diagnostic, pathological, and related suffixes.(C3) 4. Identify adjective, noun, and diminutive suffixes.(C3) 5. Apply guidelines for pluralizing terms.(C3) 6. Spell medical terms presented in this chapter.(C1)		
Unit 3:			
Prefixes	1. Define common prefixes used in medical terminology.(C1) 2. Explain how a prefix changes the meaning of a medical word.(C2) 3. Identify and define prefixes of position, number and measurement, and direction.(C1,C3)	1 hour	2 hour
Unit 4 :			
Body Structure	1. List the levels of organization of the body.(C1) 2. Define and identify three planes of the body.(C1) 3. Identify the cavities, quadrants, and regions of the body.(C3) 4. List and identify terms related to direction, position, and planes of the body.(C1,C3) 5. Identify, spell, and build words related to body structure.(C1,C3) 6. Explain diseases, conditions, and procedures related to body structure.(C2)	1 hour	2 hour
Unit : 5			
Integumentary System	1. Find the major organs of the integumentary system and explain their structure and function.(C1) 2. Explain the functional relationship between the integumentary system and other body systems.(C2) 3. Spell, and build words related to the integumentary system.(C1,C3) 4. Explain diseases, conditions, and procedures related to the integumentary system.(C2) 5. Explain pharmacology associated with the treatment of skin	1 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	disorders(C2)		
Unit : 6			
Digestive System	1. Identify the major organs of the digestive system and explain their structure and function(C3) 2. Explain the functional relationship between the digestive system and other body systems.(C2) 3. Spell and build words related to the digestive system. (C1,C3) 4. Explain diseases, conditions, and procedures related to the digestive system. (C2) 5. Explain pharmacology related to the treatment of digestive disorders. (C2)	1 hour	2 hour
Unit :7			
Respiratory System	1. Identify and explain the structures of the respiratory system. (C3) 2. Explain the functional relationship between the respiratory system and other body systems. (C2) 3. Spell, and build words related to the respiratory system. (C1,C3) 4. Explain diseases, conditions, and procedures related to the respiratory system. (C2) 5. Explain pharmacology related to the treatment of respiratory disorders. (C2)	1 hour	2 hour
Unit: 8			
Cardiovascular System	1. Identify and explain the structures of the cardiovascular system. (C2,C3) 2. Explain the functional relationship between the cardiovascular system and other body systems. (C2) 3. Spell, and build words related to the cardiovascular system. (C1,C3) 4. Explain diseases, conditions, and procedures related to the cardiovascular system. (C2) 5. Explain pharmacology related to the treatment of cardiovascular disorders. (C2)	1 hour	2 hour
Unit:9			
Blood, Lymph, and Immune Systems	1. Identify and explain the components of blood. (C2,C3) 2. Identify the structures associated with the lymph system. (C3) 3. List the cells associated with the	1 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	acquired immune response and explain their function.(C1) 4. Explain the functional relationships among the blood, lymph, and immune systems and other body systems. (C2) 5. Spell, and build words related to the blood, lymph, and immune systems. (C1,C3) 6. Explain diseases, conditions, and procedures related to the blood, lymph, and immune systems. (C2) 7. Explain pharmacology related to the treatment of blood, lymph, and immune disorders. (C2)		
Unit:10			
Urinary System	1. Identify and explain urinary structures.(C2,C3) 2. Explain the functional relationship between the urinary system and other body systems. (C2) 3. Spell, and build words related to the urinary system. (C1,C3) 4. Explain diseases, conditions, and procedures related to the urinary system. (C2) 5. Explain pharmacology related to the treatment of urinary disorders. (C2)	1 hour	1 hour
Unit:11			
Female Reproductive System	1. Identify and explain the structures of the female reproductive system. (C2,C3) 2. Explain the functional relationship between the female reproductive system and other body systems. (C2) 3. Pronounce, spell, and build words related to the female reproductive system. (C2) 4. Explain diseases, conditions, and procedures related to the female reproductive system. (C2) 5. Explain pharmacology related to the treatment of female reproductive disorders. (C2)		1 hour
Unit:12			
Male Reproductive System	1. Identify and explain the structures of the male reproductive system. (C2,C3) 2. Explain the functional relationship between the male reproductive	-	1 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	system and other body systems. (C2) 3. Spell, and build words related to the male reproductive system. (C1,C3) 4. Explain pathological conditions, diagnostic and therapeutic procedures, and other terms related to the male reproductive system. (C2) 5. Explain pharmacology related to the treatment of male reproductive disorders. (C2)		
Unit :13			
Endocrine System	1. Identify and explain the structures of the endocrine system. (C2,C3) 2. Explain the functional relationship between the endocrine system and other body systems. (C2) 3. Spell, and build words related to the endocrine system. (C1.C3) 4. Explain diseases, conditions, and procedures related to the endocrine system. (C2) 5. Explain pharmacology related to the treatment of endocrine disorders. (C2)	1 hour	2 hour
Unit: 14			
Nervous System	1. Identify and explain the structures of the nervous system. (C2,C3) 2. Explain the functional relationship between the nervous system and other body systems. (C2) 3. Spell, and build words related to the nervous system. (C1,C3) 4. Explain diseases, conditions, and procedures related to the nervous system. (C2) 5. Explain pharmacology related to the treatment of nervous disorders. (C2)	1 hour	2 hour
Unit:15:			
Special Senses	1. Identify and explain the structures of the eye and ear.(C2,C3) 2. Spell, and build words related to the special senses. (C1,C3) 3. Explain diseases, conditions, and procedures related to the special senses. (C2) 4. Explain pharmacology related to the treatment of eye and ear disorders. (C2)	1 hour	1 hour

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	13	26
Seminar		
Small group discussion (SGD)	13	26
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**39**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	-
Assignments/Presentations	-

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester / Sessional Examination 1	x			
Quiz / Viva	x	x	x	x
Assignments	x		x	x
Clinical/Practical Log Book/ Record Book	-	-	-	-

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Barbara. A Medical Terminology; A system Approach 7th edition ISBN-13: 978-0803629547, ISBN-10: 0803629540 2. Ehrlich A, Schroeder CL, Ehrlich L, Schroeder KA. Medical terminology for health professions 6th edition. Nelson Education; *ISBN*-10: 130563435
Additional References	1. Rice J. Medical Terminology for Health Care Professionals. Pearson;9th edition; *ISBN*-10: 0134495349

SEMESTER- II

COURSE CODE		COURSE TITLE
ANA1201	:	Anatomy- II
ANAT104	:	Anatomy Practical - II
PHYS102	:	Physiology- II
BIC1201	:	Biochemistry
RES1201	:	Clinical Examination in Respiratory Care
BRES 104	:	Respiratory Care Equipment
BRES 106	:	Pulmonary Diagnostics - I

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Anatomy- II**
Course Code	**ANA1201**
Academic Year	First Year
Semester	II
Number of Credits	2
Course Prerequisite	Basic knowledge of general anatomy
Course Synopsis	Human anatomy is the study of the human body and relations of various structures of the body by dissection.
Course Outcomes (COs): At the end of the course student shall be able to	
CO1	Explain the musculoskeletal system related to the upper and lower extremities. (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours (Theory)**
Unit 1:		
Pectoral region And Axilla	• Describe the pectoral muscles –pectoralis major, pectoralis minor, serratus anterior with attachments, nerve supply and actions (C1, C2) • Explain anatomical basis of winging of scapula (C2) • Describe the clavipectoral fascia (C1) • Describe the boundaries and contents of axilla (C1, C2) • Describe the axillary artery- extent, course and branches (C1, C2) • Describe the brachial plexus formation and branches (C1, C2) • Describe the Erb's point mentioning the clinical aspects (C2) • Describe the Klumpke's paralysis (C2)	3
Muscles of back and shoulder region	• Describe the muscles of back and shoulder region- trapezius, deltoid, latissimus dorsi, rhomboidus major and minor, supraspinatus, infraspinatus, teres major and minor (detailed) C1, C2) • Describe the deltoid with applied anatomy (C1, C2) • Describe the supraspinatus with applied anatomy (C1, C2) • Describe the subacromial bursa with applied anatomy (C1, C2) • Describe the rotator cuff with its role in limiting shoulder dislocation (C1, C2)	2

Content	Competencies	Number of Hours (Theory)
	• Describe each of the intermuscular spaces with boundaries and contents (C1, C2)	
Arm	• Describe the muscles of front of arm- biceps brachii, brachialis, coracobrachialis with attachments, nerve supply and actions (C1, C2) • Describe the boundaries and contents of cubital fossa (C1, C2) • Describe the brachial artery with mention of Volkmann's ischemic contracture and supracondylar fracture (C1, C2) • Describe the axillary nerve with applied anatomy (C1, C2) • Describe musculocutaneous nerve with applied anatomy (C1, C2) • Describe the triceps brachii with the nerve supply & actions (C1, C2) • Describe radial nerve with applied anatomy (C1, C2)	2
Forearm	• Name the superficial and deep muscles of front of forearm with nerve supply and actions (C1, C2) • Describe pronator teres and brachioradialis in detail (C1, C2) • Names the muscles of back of forearm with nerve supply and actions (C1, C2) • Describe the supinator in detail (C1, C2) • Explains tennis elbow (C1, C2) • Describe the extensor retinaculum with osseo-fascial compartments in detail (C1) • Describe the anatomical snuff box with boundaries and contents (C1, C2)	2
Palm	• Describe the flexor retinaculum with applied anatomy (C1, C2) • briefly Describe the palm -name thenar and hypothenar muscles with nerve supply and action (C1) • Describe adductor pollicis (C1) • Describe the lumbricals and interossei (detailed) with nerve supply and actions (C1, C2)	1
Nerves and vessels of upper limb	• Describe the ulnar nerve with applied anatomy (C1, C2) • Describe the median nerve in detail (C1, C2) • Explains carpal tunnel syndrome detailed (C1, C2) • Describe each radial and ulnar artery- extent, course and branches (C1, C2)	3
Joints of upper limb	• Describe the shoulder joint under type, articular surfaces, ligaments, relations, movements and muscles responsible with a note on applied anatomy (C1, C2)Describe the elbow joint (detailed) (C1, C2) • Describe the radioulnar joints (detailed) (C1) • Describe the wrist joint (detailed) (C1, C2)	3

Content	Competencies	Number of Hours (Theory)
	• Describe the first carpometacarpal joint (detailed) (C1)	
Venous and lymphatic drainage of upper limb	• Describe the median cubital vein with applied anatomy (C1, C2) • Describe the cephalic vein with applied anatomy (C1, C2) • Describe the basilic vein with applied anatomy (C1, C2) • Describe the lymphatic drainage of upper limb (C1, C2)	1
Sternocleidomastoid and Muscles of facial expression	• Describe the sternocleidomastoid with attachments, relations, nerve supply, actions and applied anatomy (C1, C2) • Enumerates the muscles of facial expression (C1) • Describe the orbicularis oculi, orbicularis oris and buccinator with nerve supply and actions (C1, C2)	1
Vertebrae & Vertebral column	• Describe the curvatures of the vertebral column mentioning lordosis, kyphosis, scoliosis C1, (C2) • Explains the structure, functions, regional characteristics of vertebrae (C1, C2) • Describe the parts and function of intervertebral disc with applied anatomy (C1, C2)	1
Unit 2:		
Thigh	• Describe the fascia lata, iliotibial tract, saphenous opening (C1, C2) • Describe the boundaries and content of femoral triangle (C1, C2), • Describe the femoral sheath, femoral canal with applied anatomy (C1, C2) • Describe great saphenous vein (detailed) with applied anatomy (C1, C2) • Describe the femoral artery- extent, course and branches (C1, C2) • Describe the femoral nerve with applied anatomy (C1, C2) • Describe the inguinal lymph nodes (C1) • Describe the muscles of front of thigh with attachment, nerve supply and actions (C1, C2) • Describe the adductor canal -boundaries and content with applied anatomy (C1, C2) • Describe the adductor compartment muscles with attachment, nerve supply and actions (C1, C2) • Describe the adductor magnus with attachment, nerve supply and actions (C1, C2) • Describe the obturator nerve with applied anatomy (C1, C2)	3
Gluteal region	• Describe the sensory innervation of the quadrants of gluteal region with a note on intramuscular injections (C1, C2) • Describe gluteus maximus with attachment, nerve supply	1

Content	Competencies	Number of Hours (Theory)
	and actions (C1, C2) • Describe the gluteus medius and minimus with actions and related applied anatomy (C1, C2) • Enumerate the structures under cover of gluteus maximus (C1) • Describe the relations of pyriformis with brief mention of attachment, nerve supply and actions (C1,C2)	
Back of thigh and Popliteal fossa	• Describe the hamstring muscles with attachments, nerve supply and actions (C1, C2) • Describe the popliteal fossa with boundaries and contents (C1, C2) • Describe the popliteus with emphasis on actions (C1, C2) • Describe the popliteal artery -extent, course and branches with a note on applied anatomy (C1, C2)	1
Leg	• Enumerates the anterior compartment muscles with attachment, nerve supply and actions with applied anatomy (C1, C2) • Describe the tibialis anterior in detail with emphasis on actions (C1, C2) • Describe the anterior tibial artery –extent, course and branches (C1, C2) • Enumerates the lateral compartment muscles with attachment, nerve supply and actions with applied anatomy (C1, C2) • Describe the peroneal artery (C1, C2) • Enumerates the posterior compartment muscles with attachment, nerve supply and actions (C1, C2) • Describe the soleus in detail with a note on applied anatomy (C1, C2) • Describe the gastrocnemius in detail with a note on applied anatomy (C1, C2) • Describe the tibialis posterior in detail with emphasis on actions (C1, C2) • Describe the posterior tibial artery (C1, C2)	2
Foot	• Describe the sensory innervation of the dorsum of foot (C1, C2) • Enumerates the muscles with nerve supply (C1) • Describe the dorsalis pedis artery with reference to peripheral pulse (C1, C2) • Enumerates the muscles of first and second layer of sole (C1) • Names the sensory innervation of the sole of foot (C1) • Describe the arches of foot in detail with applied anatomy (C1, C2)	2
Joints of lower limb	• Describe the hip joint under type, articular surfaces, ligaments, relations, movements and muscles responsible with a note on applied anatomy (C1, C2)	3

Content	Competencies	Number of Hours (Theory)
	• Describe the knee joint under – type, articular surfaces, ligaments, relations, movements and muscles responsible with a note on applied anatomy (C1, C2) • Describe the tibiofibular joint (detailed) (C1, C2) • Describe the ankle joint (detailed) (C1, C2) • Describe the subtalar joint (detailed) (C1)	
Nerves of lower limb	• Describe the sciatic nerve under origin, root value, course, branches with applied anatomy (C1, C2) • Describe the tibial nerve under origin, root value, course, branches with applied anatomy (C1, C2) • Describe the common peroneal nerve under origin, root value, course, branches with applied anatomy (C1, C2) • Describe the deep peroneal nerve under course, branches and applied anatomy (C1, C2) • Describe the superficial peroneal nerve under course, branches and applied anatomy (C1, C2)	2
Venous and lymphatic drainage of lower limb	• Describe the great saphenous vein (detailed) with applied anatomy (C1, C2) • Describe the small saphenous vein (C1) • Describe the lymphatic drainage of lower limb with a mention of elephantiasis (C1, C2)	1

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	**34**	**102**
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**34**	**102**
Learning Assessment Methods:		
Formative:	**Summative:**	
Unit Test	Sessional Exam I and Sessional Exam II	
Quiz	End Semester Exam	
Viva		
Assignments/Presentations		

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x					
Sessional Examination 2	x					
End Semester Exam	x					
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	• B D Chaurasia, Human Anatomy, Volume I & II. 8th edition, CBS Publishers. • Vishram Singh. General anatomy, 3rd ed. • Handbook of General anatomy by B.D. Chaurasia.					
Additional References	• Text book of Anatomy, Vishram singh, 3rd edition • Manipal Manual of Anatomy for allied health students by Dr. Sampath Madyastha.					

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Anatomy Practical- II**
Course Code	**ANA1212**
Academic Year	First year
Semester	II
Number of Credits	2
Course Prerequisite	Basic knowledge of anatomy related to musculoskeletal system
Course Synopsis	Human anatomy is the study of gross features and relations of various structures of the body by dissection.
Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Demonstrate and explain the attachment of muscles, bones and related structures of the upper and lower extremities (C2; P1)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		X						

Course Content and Outcomes:

Content	Competencies	Number of Hours
Unit 1:		
Pectoral region and axilla	1. Identifies pectoralis major, -minor, and serratus anterior and states nerve supply of each (C2, P1) 2. Identifies the axillary vessels, cords and major branches of brachial plexus (C2, P1) 3. Identifies the trapezius, deltoid, latissimus dorsi, supraspinatus, infraspinatus, teres major and minor (C2, P1) 4. Identifies rhomboidus major and minor (C1, P1) 5. Identifies the intermuscular spaces and their contents (C2, P1)	3
Front and back of arm, cubital fossa,	1. Identifies the muscles of front and back of arm (C2, P1) 2. Identifies the boundaries and contents of cubital fossa (C2, P1)	2
Front and back of forearm and dorsum of hand	1. Identifies the muscles of front of forearm (C2, P1) 2. Identifies the muscles of back of forearm (C1, P1) 3. Identifies the extensor retinaculum (C2, P1) 4. Identifies the osseo-fascial compartments (C1, P1) 5. Identifies the anatomical snuff box with boundaries and contents (C2, P1)	2
Bones of upper limb	1. Demonstrates the major features and attachments of clavicle, scapula, Humerus (C2,	2

Content	Competencies	Number of Hours
	P1) Demonstrates the major features and attachments of radius and ulna (C2, P1) 2. Identifies the carpals (C1, P1) 3. Identifies the carpals, metacarpals, phalanges and joints -MCP, DIP, PIP in the articulated hand (C1, P1)	
Palm of the hand	1. Identifies the thenar and hypothenar muscles (C1, P1) 2. Identifies the carpals (C1, P1) 3. Identifies the carpals, metacarpals, phalanges and joints -MCP, DIP, PIP in the articulated hand (C1, P1)	2
Blood vessels of upper limb	1. Identifies the axillary artery, brachial artery, radial artery, ulnar artery and superficial palmar arch (C2, P1) 2. Identifies the cephalic vein, basilic vein, axillary vein and median cubital vein (C2, P1)	2
Sternocleidomastoid Muscles of facial expression, Vertebrae	1. Identifies the sternocleidomastoid (C2, P1) 2. Identifies the orbicularis oculi, orbicularis oris (C2, P1) 3. Identifies cervical, thoracic, lumbar vertebrae and sacrum (C1, P1)	2
Unit 2:		
Hip bone Femur	1. Demonstrates the major features and attachments of hip bone and femur (C2, P1)	1
Front of thigh, femoral triangle, Adductor canal	1. Identifies the femoral triangle with its boundaries and contents (C2, P1) 2. Identifies the femoral artery, femoral vein, great saphenous vein, femoral nerve (C2, P1) 3. Identifies the sartorius, rectus femoris and vasti muscles (C2, P1) 4. Identifies the adductor canal with its boundaries and contents (C1, P1)	2
Medial side of thigh, Gluteal region,	1. Identifies the gracilis, adductor longus (C2, P1) and notices the other adductor muscles (C1, P1) 2. Identifies the gluteus maximus, gluteus medius, pyriformis (C2, P1) 3. Identifies the sciatic nerve, tibial nerve, common peroneal nerve (C2, P1)	2
Back of thigh, Popliteal fossa, Knee joint	1. Identifies the biceps femoris, adductor magnus, semitendinous, semimembranous, popliteus (C2, P1) 2. Identifies the popliteal vessels (C2, P1) 3. Identifies the medial and lateral meniscus, anterior cruciate ligament (C1, P1, P2)	3
Tibia, Patella, Fibula	1. Demonstrates the major features and attachments of tibia and Fibula (C2, P1) 2. Identifies the patella and names some	1

Content	Competencies	Number of Hours
	attachments.	
Leg	1. Identifies the flexor retinaculum, tibialis anterior, extensor hallucis longus, extensor digitorum longus and peroneus tertius along with their nerve supply (C2, P1) 2. Identifies the peroneus longus and peroneus brevis (C2, P1) and names their nerve supply (C1, C2, P1) 3. Identifies the gastrocnemius, soleus, Achilles tendon, tibialis posterior	3
Tarsal bones & articulated foot	1. Identifies the tarsals –calcaneus, talus, navicular, cuboid (C1, P1,) 2. Identifies the bones in a articulated foot	1
Sole & dorsum of foot	1. Identifies the extensor retinaculum and notices underlying structures (C2, P1) 2. Identifies the plantar aponeurosis, muscles of first and second layers of sole (C2, P1)	2

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group demonstration (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical **(02 hours each)**	30	90
Revision	04	12
Assessment	03	09
Total	**37**	**111**

Assessment Methods:	
Formative:	**Summative:**
Table test	Mid Semester (Practical)
Spotters test	End Semester Exam (Practical)

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid semester Sessional Examination 1	x		-	-	-	-
Table test	x					
Spotters test	x					
End Semester Exam	x					

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback

Main Reference:	1. B D Chaurasia, Human Anatomy, Volume I & II. 8th edition, CBS Publishers. 2. Vishram Singh. General anatomy, 3rd ed. 3. Handbook of General anatomy by B.D. Chaurasia.
Additional References	1. Text book of Anatomy, Vishram singh, 3rd edition 2. Manipal Manual of Anatomy for allied health students by Dr. Sampath Madyastha.

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Physiology - II**
Course Code	**PHY1201**
Academic Year	First Year
Semester	II
Number of Credits	2
Course Prerequisite	Basic knowledge of general physiology
Course Synopsis	This module provides a comprehensive knowledge about normal functions of the organ systems of the body to understand the physiological basis of health and disease required for health professionals.

Course Outcomes (COs): At the end of the course student shall be able to:	
CO1	Know the basic facts and concepts of Physiology (C1).
CO2	To have a knowledge of the normal functions of organ systems of the body to facilitate an understanding of physiological basis of health (C2).
CO3	To integrate the functions of various organ systems & to understand their functions as a body unit (C2).
CO4	Explain the physiological basis of disease processes (C2).

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x							
CO5								
CO6								

Course Content and Outcomes:

Topics	**Competencies**	**Number of Hours**
Unit 1: Central nervous System		
General organization of nervous system	• Outline the organization of nervous system (C1) • Outline the organization of autonomic nervous system(ANS) C1) • Enumerate the functions of ANS (C1) • Mention the functional areas of cerebral cortex and their functions (C1)	1
Receptors	• Classify sensory receptors according to type and location of stimulus, giving examples for each (C2)	1

Topics	Competencies	Number of Hours
	• Explain the property of 'specificity' and 'adequate stimulus' (C2) • Explain the property of 'adaptation' of sensory receptors (C2)	
Synapse	• Define 'synapse' (C1) • Describe the structure of a synapse (C2) • Explain the events in synaptic transmission (C2)	1
Reflexes	• Define reflex (C1) • Enumerate the components of a reflex arc with the help of a diagram (C1) • Describe the stretch reflex with the help of a diagram(C2) • Describe withdrawal reflex with the help of a diagram(C2) • Explain the importance of withdrawal reflex (C2)	2
Ascending pathways	• Outline the general organization of sensory pathways(C1) • Describe the dorsal column, lateral spinothalamic and anterior spinothalamic tracts with the help of labelled diagrams(C2) • Mention the different sensations that are carried by the above pathways (C1)	2
Descending pathways	• Describe the pyramidal/corticospinal tract with the help of a labelled diagram (C2) • Tabulate the differences between 'upper motor neuron lesion' and 'lower motor neuron lesion (C2)	1
Cerebellum	• Name the functional divisions of cerebellum (C1) • Enumerate the functions of each lobe of cerebellum(C1) • List the clinical features of cerebellar lesion (C1) • List the clinical features of cerebellar lesion (C2)	1
Basal ganglia	• Mention the components of basal ganglia (C1) • Enumerate the functions of basal ganglia (C1) • Explain the cause and clinical features Parkinson's disease (C2) • Explain the basis of treatment of Parkinson's disease (C2)	1
Thalamus and Hypothalamus	• Explain the functions of thalamus (C2) • List the different nuclei of hypothalamus (C1) • Explain the functions of hypothalamus (C2)	2
Cerebrospinal fluid	• Describe the formation, circulation, absorption and functions of CSF (C2) • Mention the method of collection of a sample of CSF and its indications (C1) • Explain the functions of higher centers of brain(C2)	1

Topics	Competencies	Number of Hours
Unit 2: Gastrointestinal system		
Salivary secretion & Deglutition	• Mention the composition of saliva (C1) • Explain the functions of saliva (C2) • Describe the regulation of salivary secretion (C2) • Describe the effects of Xerostomia (C2) • Define deglutition (C1) • Explain the stages of deglutition (C2) • Describe dysphagia (C2) • Describe Achalasia cardia (C2)	1
Stomach	• Describe the functions of stomach (C2) • Mention the composition of gastric juice (C1) • Describe functions of gastric juice (C2) • Describe the mechanism of secretion of hydrochloric acid (C2) • Describe the regulation of gastric juice secretion(cephalic, gastric and intestinal phases) (C2)	1
Exocrine portion of Pancreas; Liver and biliary system	• Outline the composition of pancreatic juice (C1) • Describe the functions of pancreatic juice (C2) • Describe the neural and hormonal regulation of pancreatic juice (C2) • Outline the composition of hepatic bile(C1) • Describe the functions of bile(C2) • Enumerate the functions of gall bladder(C1)	1
Small intestine and large intestine	• Composition and functions of small intestinal secretions (C2) • Different types of Intestinal movements and their significance (C2) • Explain different types of small intestinal movements and their significance(C2) • List the functions of large intestine(C1)	1
Unit 3: Renal system		
Introduction & Glomerular filtration	• List the functions of kidneys (C1) • Draw a labelled diagram of a nephron (C1) • Mention the normal value of renal blood flow (C1) • Define glomerular filtration rate(GFR) (C1) • Mention the normal value of GFR (C1) • Explain the factors influencing GFR (C2) • List the substances used for the determination of GFR (C1)	1
Reabsorption and secretion in renal tubules	• Describe tubular reabsorption of sodium, glucose and water (C2) • Define tubular load, renal threshold and tubular/transport maximum (C1)	1

Topics	Competencies	Number of Hours
	• Mention the normal values for tubular load, renal threshold and tubular/transport maximum (C1)	
Mechanism of concentration/dilution of urine	• Describe the role of counter current multiplier and counter current exchanger in the formation of urine (C2)	1
Physiology of micturition	• Describe the nerve supply to urinary bladder (C2) • Describe the micturition reflex (C2) • List the functions of skin	1
Unit 4: General principles of endocrinology		
Introduction and Pituitary gland	• Name the major endocrine glands and their secretions(C1) • Mention the chemical nature of hormones with examples (C2) • List the anterior pituitary hormones (C1) • Describe the actions of growth hormone (C2) • Describe the regulation of secretion of growth hormone(C2) • Describe the cause and clinical features of gigantism (C2) • Describe the cause and clinical features of acromegaly (C2) • Describe the cause and clinical features of dwarfism (C2) • List the hormones of posterior pituitary (C1) • Describe the actions of posterior pituitary hormones (C2) • Describe diabetes insipidus (C2)	1
Thyroid gland	• List the hormones of thyroid gland (C1) • Describe the actions of thyroid hormones(C2) • Describe the regulation of secretion of thyroid hormones (C2) • Describe the cause and clinical features of hyperthyroidism (C2) • Describe the cause and clinical features of cretinism (C2) • Describe the cause and clinical features of myxedema(C2) • Explain the actions of glucocorticoids (C2)	2
Adrenal cortex & Adrenal medulla	• Describe the regulation of secretion of glucocorticoids (C2) • Explain the cause and clinical features of Cushing's syndrome (C2) • Describe the actions of mineralocorticoids (C2) • Describe the cause and clinical features of Addison's disease (C2) • List the hormones of adrenal medulla (C1)	1

Topics	Competencies	Number of Hours
	• Describe the actions of adrenal medullary hormones (C2)	
Parathyroid gland	• Describe the actions of PTH (C2) • Describe the regulation of secretion of PTH (C2) • Describe the effects of hyperparathyroidism (C2)	1
Endocrine Pancreas	• Describe the actions of insulin (C2) • Describe the regulation of secretion of insulin (C2) • Describe the cause and clinical features of diabetes mellitus (C2) • List the actions of glucagon (C1) • Describe the regulation of secretion of glucagon (C2)	1
Unit 5: Reproductive system		
Male Reproductive system	• Describe the organization of male reproductive system(C2) • Describe the structure and functions of testes (C2) • Define spermatogenesis (C1) • Describe the stages of spermatogenesis (C2) • Mention the actions of testosterone (C1) • Describe the regulation of secretion of testosterone (C2)	1
Female Reproductive system	• Describe the structure of female reproductive system(C2) • Explain the actions of Estrogen and Progesterone (C2) • Describe the ovarian changes during menstrual cycle(C2) • Describe the uterine endometrial changes during menstrual cycle (C2) • Explain the hormonal control of ovarian functions (C2) • Describe the indicators of ovulation (C2)	2
Pregnancy and Lactation; Contraceptive methods	• Enumerate the functions of placenta (C1) • Describe milk ejection reflex (C2) • Mention various contraceptive methods in males (C1) • Mention various contraceptive methods in females (C1) • Explain the mechanism of action of various contraceptive methods (C2)	1

Learning Strategies, Contact Hours and Student Learning Time (SLT):						
Learning Strategies	**Contact Hours**		**Student Learning Time (SLT)**			
Lecture	30		90			
Seminar						
Small group discussion (SGD)						
Self-directed learning (SDL)						
Case Based Learning (CBL)						
Clinic						
Practical						
Revision						
Assessment						
Total	**30**		**90**			
Assessment Methods:						
Formative:	**Summative:**					
Nil	Sessional Examination I and Sessional Examination II (Theory)					
	End Semester Exam (Theory)					
	Viva					
Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Sessional Examination 1	x	x				
Sessional Examination 2	x	x	x	x		
End Semester Exam	x	x	x	x		
Feedback Process:	Mid-Semester Feedback					
	End-Semester Feedback					
Main Reference:	1. Basics of Medical Physiology- 3rd Edition by D Venkatesh and HH Sudhaker 2. Manipal Manual of Medical Physiology,1st edition, C. N. ChandraShekar					
Additional References						

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Biochemistry**
Course Code	**BIC1201**
Academic Year	First Year
Semester	II
Number of Credits	3
Course Prerequisite	Basic knowledge of Biology and Chemistry
Course Synopsis	Biochemistry broadly deals with the chemistry of life and living processes. It helps in understanding the building blocks – proteins, carbohydrates, fats, nucleic acids and is necessary for allied health professions students to understand various biochemical mechanisms so as to correlate with or identify the pathological processes. Knowledge of biomolecules is necessary to understand the various laboratory investigations and their relevance in clinical practice

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the classification, composition and functions of macromolecules (C2)
CO2	Describe the process of digestion, absorption and metabolism of carbohydrates, lipids and proteins (C2)
CO3	Summarize the concepts of nutrition, balanced diet and role of macro and micronutrients in the maintenance of health (C2)
CO4	Summarize the features and investigations in diabetes mellitus and acid-base disorders (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x							

Course Content and Outcomes:

Unit	**Content**	**Competencies**	**Number of Hours**
Unit 1: ENZYMES			
At the end of this chapter, a student should be able to 1. Define the term ‘enzyme’ (C1) 2. Classify enzymes based on reaction specificity (IUBMB classification) (C2) 3. Give one example (names of enzymes & reaction catalyzed) for each class of enzymes (C1) 4. Define the term ‘isoenzymes’ (C1)			2

Unit	Content	Competencies	Number of Hours
5. Explain isoenzymes with examples (creatine kinase, lactate dehydrogenase) (C2) 6. Define the term 'proenzyme or zymogen' with pepsinogen and trypsinogen as examples (C1) 7. Describe the utility of serum enzymes as diagnostic markers (C2) 8. Mention the diagnostic utility of following enzymes (C1) • CK • ALP • AST • ALT • LDH			
Unit 2: CARBOHYDRATE CHEMISTRY			
At the end of this chapter, a student should be able to 1. Define the term 'carbohydrates' (C1) 2. Classify carbohydrates with examples for each class (C2) 3. Classify monosaccharides with examples based on (C2) • Number of carbon atoms • Functional groups 4. Mention the source and composition of following disaccharides (C1) • Sucrose • Lactose • Maltose 5. Classify polysaccharides based on composition with examples (C2) 6. Explain the structure of starch and glycogen with schematic representation (C2 7. List the differences between starch and glycogen (C1) 8. Mention the occurrence and functions of heparin and chondroitin sulphate (C1)			2
Unit 3: CARBOHYDRATE DIGESTION AND ABSORPTION			
At the end of this chapter, a student should be able to 1. Describe the complete digestion of dietary polysaccharides (starch and glycogen) (C2) 2. Describe the reactions catalyzed by the following brush border enzymes (C2) • Maltase • Sucrase-isomaltase • Lactase 3. Illustrate the mechanisms of absorption of monosaccharides in the small intestine (C2) 4. Explain the significance of including sodium chloride along with glucose in the oral rehydration solution (C2)			2
Unit 4: CARBOHYDRATE METABOLISM			
A. Glycolysis At the end of this chapter, a student should be able to 1. Define aerobic and anaerobic glycolysis (C1) 2. Mention the site and subcellular site of glycolysis (C1) 3. Describe the steps of glycolysis with all the enzymes and coenzymes at each step (C2) 4. Mention the regulatory enzymes and list the names of hormones that			2

Unit	Content	Competencies	Number of Hours
		regulate it in the well-fed state and starvation (C1) 5. Calculate the energetics of aerobic and anaerobic glycolysis (C2)	
	B. Gluconeogenesis At the end of this chapter, a student should be able to 1. Define gluconeogenesis (C1) 2. Mention the sites & subcellular sites of gluconeogenesis (C1) 3. List the precursors for gluconeogenesis (C1) 4. List the key enzymes of gluconeogenesis (C1) 5. Describe the synthesis of glucose from pyruvate and lactate (C2) 6. Mention the regulatory enzymes and list the names of hormones that regulate it in the well-fed state and starvation (C1) 7. Explain the significance of gluconeogenesis (C2)		2
	C. Citric acid cycle At the end of this chapter, a student should be able to 1. Recall the reaction catalyzed by pyruvate dehydrogenase complex and mention its coenzymes (C1) 2. Mention the site and subcellular site of citric acid cycle (C1) 3. Describe the reactions of citric acid cycle with all enzymes and coenzymes (C2) 4. Mention the regulatory enzymes of citric acid cycle (C1) **5.** Calculate the energetics of citric acid cycle (C2)		2
	D. Glycogen metabolism At the end of this chapter, a student should be able to 1. Mention the function of glycogen in liver and muscle (C1) 2. Define glycogenesis & glycogenolysis (C1) 3. Mention the site and subcellular site of glycogen metabolism (C1) 4. Mention the fate of end products of glycogenolysis in liver (role of glucose 6-phosphatase) and muscle (C1) 5. Mention the regulatory enzymes and the hormones involved in regulation in well-fed state and starvation (C1) **6.** List the glycogen storage disorders mentioning their names, defects and tissues affected (Type I, V & VI) (C1)		1
Unit 5: ELECTRON TRANSPORT CHAIN AND OXIDATIVE PHOSPHORYLATION			
	At the end of this chapter, a student should be able to 1. Define the electron transport chain (ETC) (C1) 2. Name the subcellular site of ETC (C1) 3. Describe the complexes of ETC (with their components and order of arrangement) and mention the mobile electron carriers (C2) 4. Name the inhibitors for each of the complexes of ETC (C1) 5. Define oxidative phosphorylation (C1)		1
Unit 6: LIPID CHEMISTRY			
	At the end of this chapter, a student should be able to 1. Define lipids (C1) 2. Explain the functions of lipids in the body (C2) 3. Classify lipids with examples for all the subclasses (C2) 4. Classify fatty acids with examples-saturated, unsaturated (based on number of double bonds), essential fatty acids (C2)		1
Unit 7: LIPID DIGESTION, ABSORPTION AND ASSOCIATED DISORDERS			
	At the end of this chapter, a student should be able to		2

Unit	Content	Competencies	Number of Hours
1. Explain the process of emulsification of lipids (C2) 2. Describe the digestion of lipids in the stomach and intestine (C2) 3. Illustrate the process of absorption of lipids (C2) 4. Define steatorrhea and list its causes (C1)			
Unit 8: LIPID METABOLISM			
A. `De novo synthesis of fatty acids At the end of this chapter, students should be able to 1. Mention the site and subcellular site of de novo synthesis of fatty acids (C1) 2. List the sources of acetyl CoA for de novo synthesis of fatty acids (C1) 3. Explain the reaction catalyzed by acetyl CoA carboxylase (C2) 4. Mention the regulatory enzyme and the hormones involved in regulation in well-fed state and starvation (C1)			1
B. Synthesis of triacylglycerol (TAG) At the end of this chapter, students should be able to 1. Show the schematic structure of triacylglycerol (C1) 2. Mention the site and subcellular site of TAG synthesis (C1) 3. Describe the reactions of TAG synthesis (C2) 4. Mention the fate of TAG in liver and adipose tissue (C1)			1
C. Lipolysis At the end of this chapter, students should be able to 1. Mention the site and subcellular site of lipolysis (C1) 2. Describe the reactions of lipolysis (C2) **3.** Mention the regulatory enzymes and the hormones involved in regulation in well-fed state and starvation (C1)			1
D. Beta oxidation of fatty acids At the end of this chapter, students should be able to 1. Define beta-oxidation (C1) 2. List the site and subcellular site of beta-oxidation (C1) 3. Describe the activation of palmitic acid (C2) 4. Explain the transport of activated palmitic acid into mitochondria (carnitine shuttle) (C2) 5. Describe the reactions of beta oxidation (C2) 6. Calculate the energetics of beta oxidation of palmitic acid (C2)			2
E. Lipoproteins At the end of this chapter, student should be able to 1. Classify lipoproteins based on their electrophoretic mobility and ultracentrifugation properties (C2) Mention the site of synthesis and the functions of Chylomicrons, VLDL, LDL and HDL (C1)			1
Unit 9: AMINO ACID & PROTEIN CHEMISTRY			
At the end of this chapter, student should be able to 1. Recognize the general structure of D and L amino acids (C1) 2. Classify amino acids based on the following with examples (C2) • Presence in proteins (standard and non-standard amino acids)			3

Unit	Content	Competencies	Number of Hours
• Metabolic fate (glucogenic and ketogenic amino acids) • Nutritional requirement (essential and non-essential amino acids) 3. Classify proteins based on composition, functions and shape with examples (C2) 4. Describe the structure of mature collagen with diagram (C2) 5. Explain with illustrations the biosynthesis of mature collagen emphasizing the importance of prolyl hydroxylase, lysyl hydroxylase and lysyl oxidase (C2)			
Unit 10: PROTEIN DIGESTION AND ABSORPTION			
At the end of the chapter, a student should be able to 1. Outline the activation of zymogens in the GIT (C1) 2. List the endo and exopeptidases in the digestive juices (C1)			1
Unit 11: AMINO ACID METABOLISM			
At the end of the chapter, a student should be able to 1. Explain transamination of amino acids with suitable examples (C2) 2. Describe the generation of ammonia by oxidative deamination using L-glutamate dehydrogenase. (C2) 3. Study urea cycle as follows a. Name its site and subcellular site (C1) b. Describe its reactions (C2) c. Mention its significance (C1) 4. Recall the physiologically important products derived from the following amino acids (C1) a. Glycine b. Tyrosine c. Methionine d. Tryptophan			2
Unit 12: GENERAL CONCEPTS OF NUTRITION			
At the end of the chapter, a student should be able to 1. Define the term balanced diet (C1) 2. Define caloric value of food and list the caloric values of carbohydrates, proteins and fats (C1) 3. State the total daily caloric requirements of an adult male and female (for sedentary, moderate and heavy workers) and for pregnant and lactating women (C1) 4. Define recommended dietary allowance (RDA) (C1) 5. Study basal metabolic rate as follows a. Define (C1) b. List the normal values for men and women (C1) c. Explain the factors affecting BMR (C2) 6. Define thermic effect (SDA) of food and recall the values for macronutrients (C1)			2
Unit 13: CARBOHYDRATES, PROTEINS AND FATS IN NUTRITION			
A. Carbohydrates At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. Study dietary fibers as follows a. Define (C1)			2

Unit	Content	Competencies	Number of Hours
b. Mention its RDA (C1) c. List the examples with their sources (C1) d. Explain its beneficial effects (C2) **B. Proteins** At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. Define essential amino acids with examples (C1) 3. Study biological value as follows a. Define (C1) b. Name the protein used as standard for determining it (C1) c. List the protein sources with high and low biologic values (egg albumin, milk, fish, meat, rice, wheat and soy protein) (C1) 4. Define the term nitrogen balance (C1) 5. Explain positive and negative nitrogen balance with conditions during which they occur (C2) 6. Define the term limiting amino acids giving suitable examples (C1) 7. Explain mutual supplementation of proteins with examples (C2) **C. FATS** At the end of the chapter, a student should be able to 1. Mention the RDA (C1) 2. List the functions of cholesterol in the body (C1) 3. Study essential fatty acids as follows a. Define (C1) b. Mention its RDA (C1) c. Explain their functions and deficiency manifestations (C2) 4. Explain saturated and unsaturated (mono and poly) fatty acids with suitable examples, mentioning its sources and functions (C2)			
Unit 14: MINERALS			
At the end of this chapter, a student should be able to 1. Define the terms macro and micro minerals with examples. (C1) 2. Mention the sources and RDA for iron (C1) 3. Explain the functions, disorders of deficiency & excess for iron (C2) 4. Mention the sources, RDA and functions for calcium and phosphorus (C1) 5. Mention the normal serum levels of calcium and phosphorus and the hormones which regulate it **(**C1**)**			2
Unit 15: VITAMINS			
At the end of this chapter, a student should be able to 1. Define the term vitamins (C1) 2. List the classes of vitamins based on solubility (C1) 3. Study the water soluble vitamins mentioned below • Thiamine • Riboflavin • Niacin • Pantothenic acid • Pyridoxine • Biotin			3

Unit	Content	Competencies	Number of Hours
• Cobalamin • Folic acid • Ascorbic acid as follows ➢ List the RDA, sources and coenzyme forms (C1) ➢ Describe the biochemical functions (C2) ➢ List the features of disorders associated with their deficiencies (C1) 4. Study the fat soluble vitamins A, D, E, K as follows ➢ List the RDA, sources and chemical forms. (C1) ➢ Describe the biochemical functions. (C2) ➢ List the features of disorders associated with their deficiencies and excess. (C1)			
16. MALNUTRITION			
At the end of this chapter, a student should be able to 1. Define the classes of protein energy malnutrition. (C1) 2. Compare the similarities and differences between marasmus and kwashiorkor (C2)			1
17. CLINICAL BIOCHEMISTRY			
A. GLUCOSE HOMEOSTASIS AND DIABETES MELLITUS At the end of this chapter, a student should be able to 1. Summarize the effect of the hormones involved in blood glucose homeostasis (C2) 2. Study diabetes mellitus as follows • Define (C1) • Classify and compare the types 1 and 2 (C2) • Mention the signs and symptoms (C1) • Mention the normal plasma levels of fasting, postprandial and random glucose & their utility in diagnosis (C1) • Explain the relevant investigations involved in the diagnosis and management (HbA_{1C}, procedure and interpretation of GTT, microalbuminuria) (C2) • Explain the biochemical basis for features of diabetic ketoacidosis (C2)			2
B. SIGNIFICANCE OF ESTIMATIONS OF VARIOUS BIOCHEMICAL PARAMETERS IN BLOOD At the end of this chapter, a student should be able to Mention the normal serum levels of glucose, protein, urea, uric acid, bilirubin, cholesterol and creatinine and conditions in which they are altered **(**C1**)**			1
C. ACID BASE BALANCE AND DISTURBANCES At the end of this chapter, a student should be able to: 1. Define the terms acid, base, pH and pKa (C1) 2. Study buffers as follows • Define (C1) • Write the Henderson-Hasselbalch equation for different buffer systems (C1) • List the principal buffer systems in ECF, ICF and in urine (C1)			1

Unit	Content	Competencies	Number of Hours
		• Mention the pKa value, normal ratio of base/acid in the plasma for bicarbonate and phosphate buffer systems (C1) 3. Study acid-base disorders as follows • Define the different classes (C1) • Explain the conditions causing acidosis & alkalosis (metabolic & respiratory) (C2) Mention the primary and compensatory changes in acid base disorders (C1)	
Unit 18: MOLECULAR BIOLOGY			
		At the end of this chapter, a student should be able to 1. Name the purine and pyrimidine bases (C1) 2. Define nucleosides and nucleotides with examples (C1) 3. Illustrate the Watson and Crick model of B-DNA structure (C2) 4. List the different types of RNA (C1) 5. Recall the structural differences between DNA and RNA (C1) **6.** Define replication, transcription and translation (C1)	2

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	4	16
Total	**49**	**151**

Assessment Methods:	
Formative:	**Summative:**
	Mid Semester/Sessional Exam (Theory)
	End Semester Exam (Theory)

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**		
Mid Semester / Sessional Examination 1	x	x				
Sessional Examination 2	x	x	x	x		
End Semester Exam	x	x	x	x		

Feedback Process:	Mid-Semester Feedback
Main Reference:	1. Essentials of Biochemistry, U satyanarayana, U Chakrapani (2nd edition) 2. Handbook of Biochemistry for Allied & Nursing Students, Shivananda Nayak B (2nd edition)

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical examination in Respiratory care**
Course Code	**RES1201**
Academic Year	First Year
Semester	II
Number of Credits	4
Course Prerequisite	Student should have basic knowledge about the anatomy and physiology of respiratory and cardiovascular systems.
Course Synopsis	1. This module outlines the knowledge and skills relevant to patient assessment and care. 2. To learn the fundamentals behind the devices that are used in respiratory care 3. To familiarize the various equipment or procedure used towards patient care.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Demonstrate focused physical examination and patient-history recording(C2)
CO2	Application of patient assessment skills in identifying abnormalities. (C3)
CO3	Explain various diagnostic tools used for assessing pulmonary, cardiovascular and sleep disorder. (C2)
CO4	Explain in details the neonatal, pediatric and gediatric assessments.(C2)
CO5	Explain the assessment and plan required for home care ventilation.(C2)
CO6	Explain and build the respiratory care documentation. (C2,C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x	x						
CO2		x				x		
CO3				×	x			
CO4	x		x					
CO5							x	x
CO6						x		x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**	
		Lecture	**Tutorial**
Unit 1:			
Preparing for the patient encounter	1. Define patient-centred care and identify its key elements (C1) 2. Identify major factors affecting communication between the patient and clinician.(C3) 3. Identify patients' needs and	02	02

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	preferences into your assessment and care planning (C3) 4. Identify the key abilities required for culturally competent communication with patients (C3) 5. Identify standard infection control procedures needed during patient interaction(C3)		
Unit 2:			
Medical history and the interview	1. Identify the importance of properly obtaining and recording a patient history. (C3) 2.Explain the techniques for structuring a patient interview.(C2) 3.Identify alternative source to avail patient history (C3) 4.Define the difference between objective and subjective data and the difference between signs and symptoms (C1) 5.Explain components of a complete health history and the type of information found in each section of the history (C2) 6. Summarize what is indicated by a DNR order and label on the patient's chart. (C2)	02	02
Unit 3:			
Cardiopulmonary symptoms	- 1.Explain the causes and common characteristics of the following symptoms(C2) - Cough - Sputum production - Hemoptysis - Dyspnea - Chest pain - Dizziness and fainting - Swelling of the ankles - Fever, chills and night sweats - Headache, altered mental status and personality changes - Snoring - Gastroesophageal reflux - Daytime somnolence	02	01
Unit 4			
Vital signs	1. Identify the four classic vital signs and the value of monitoring their trends. (C3) 2. Identify the clinical significance of other bedside findings including abnormal	02	01

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	sensorium and level of pain (C3) 3. Explain normal values if vital signs (C2) 4. Expalin the following terms: (C2) - Fever - Tachycardia - Bradycardia - Bradypnea - Pulsus paradoxus - Pulsus alternans - Tachypnea - Systolic blood pressure - Diastolic blood pressure - Hypertension		
Unit 5			
Fundamentals of physical examination	1. Explain the four components of physical examination (C2) 2. Explain the importance of reviewing the history of present illness before performing a physical examination(C2) 3. Explain significance of the following(C2) Nasal flaring Cyanosis Pursed-lip breathing Diaphoresis Changes in pupillary size Deviated tracheal position Jugular venous distention 4. Identify the topographic position (C3) 5. Define the various thoracic configuration abnormalities(C1) 6. Define the various abnormal breathing pattern(C1) 7. Explain clinical significance of central and peripheral cyanosis (C2) 8. Identify the normal and abnormal lung sounds(C3)	02	02
Unit 6			
Neurological examination	1. Define key terms related to neurologic assessment(C1) 2. Explain the functional anatomy of the nervous system(C2) 3. Explain cortical function of the different lobes of the brain(C2) 4. Explain functions of the brainstem, the cerebellum, and the 12 pairs of cranial nerves (C2) 5. Explain the common techniques used to assess mental status(C2) 6. Make use of Glasgow Coma Scale(C3) 7. Explain common techniques to assess	01	01

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	cranial nerves, sensory system, motor system, coordination and gait. (C2) 8. Explain common techniques used to assess deep, superficial and brainstem reflexes (C2) 9. Define the ancillary tests used in neurologic assessment(C1)		
Unit 7			
Clinical laboratory studies	1. Explain the three phases of laboratory testing (C2) 2. Explain the composition of blood(C2) 3. Explain the importance of specimen integrity and effects on laboratory tests results (C2) 4. Define laboratory test sensitivity, specificity and positive and negative predictive value(C1) 5. Expalin the meaning of reference range (C2) 6. Define(C1) - Leucocytosis - Leukopenia - Relative and absolute count - Neutrophilia - Neutropenia - Lymphocytosis - Lymphopenia - Monocytosis - Eosinophilia - Basophilia - Leukaemia - Anemia - Hemostasis	02	--
Unit 8			
Interpretation of blood gases	1. Identify reference ranges for both arterial blood gases and oximetry parameters (C3) 2. Identify indications of blood gas and oximetry analysis (C3) 3. Explain the difference between invasive and non-invasive methods for measuring blood gas and oximetry parameters (C2) 4. Outline procedures in obtaining an arterial blood sampling (C2) 5. Apply common indices of oxygenation to assess the cause and severity of hypoxemia(C3) 6. Make use of the Henderson-Hassebach equation to relate changes in PCO2,	01	02

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	and HCO3- to pH.(C3) 7. Identify the common pre-analytic, analytic and post-analytic errors in blood gas sampling. (C3) 8. Explain the common causes, compensatory mechanisms, expected blood gas findings seen in simple metabolic and respiratory disorders. (C2)		
Unit 9			
Pulmonary function testing	1. Identify indications and contraindications for basic spirometry. (C3) 2. Compare between measurement and use of slow vital capacity and forced vital capacity.(C2) 3. Explain use of peak flow meter. (C2) 4. Explain about maximum voluntary ventilation.(C2) 5. List the acceptability and repeatability criteria for FVC maneuver(C1) 6. List the Indications for DLCO(C1) 7. List the Indications for lung volume measurement (C1)	01	01
Unit 10			
Chest imaging	1. Explain how chest radiograph is produced 2. Define the terms radiolucent and radiopaque(C2) 3. Explain the appearance of certain organ or tissue on a radiograph. (C2) 4. List the technical qualities of a chest x-ray(C1) 5. Explain the significance of various special radiographic evaluation signs(C2) 6. Outline the typical clinical and chest radiographic findings for the following (C2)	01	02
Unit 11			
Interpretation of electrocardiogram tracings	1. Explain the clinical value of the ECG(C2) 2. Explain the clinical findings that indicate the need for an ECG recording (C2) 3. Define certain ECG terminologies and its application(C1) 4. Explain the normal ECG and its physiological correlation(C2) 5. Identify the abnormal ECGs(C3)	01	02

Content	Competencies	Number of Hours	
		Lecture	Tutorial
Unit 12			
Neonatal and pediatric assessments	1. Explain the type of information found in pregnancy, labor and delivery history and the clinical significance of common findings(C2) 2. Explain APGAR scoring system and its interpretation(C2) 3. Identify normal values for the vital signs in newborn ad older children and its clinical applications(C3) 4. Identify normal laboratory values and its abnormalities(C3) 5. Identify clinical signs of respiratory distress(C3) 6. Identify normal arterial blood gas values in neonates(C3) 7. Explain the chest x-ray findings in a neonate(C2) 8. List the advantages and indications of flexible bronchoscopy in infants and children(C1)	01	01
Unit 13			
Older patient assessments	1. List several techniques for reducing communication barriers with older patients(C1) 2. Explain the Importance of loss of vision and hearing in geriatric assessment and identifying techniques to overcome it(C2) 3. List specific diagnostic tests that have altered. Age-related normal values(C1)	01	01
4. Unit 14			
Respiratory monitoring in critical care	1. Identify the methods, normal values and significance of measurement of lung volumes in critical care unit (C3) 2. Identify the methods, normal values and significance of measurement airway pressures or related indices. (C3) 3. List the definition, methods of detection and methods of minimizing auto-PEEP.(C1) 4. Explain Oxygen transport and its significance.(C2) 5. List the parameters used to measure oxygenation and utilization. (C1)	02	02
Unit 15			
Cardiac output measurement	1. Define cardiac output, stroke volume, stroke volume index, cardiac index. (C1)	01	01

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	2. Explain method of calculation, common reference range and effect of sympathetic nervous stimulation on cardiac output.(C2)		
Unit 16			
Nutritional assessment	1. Compare the nutrition, respiration and pulmonary status.(C2) 2. Explain the Functional importance of oxygen in nutrition(C2) 3. Define Values determining energy expenditure.(C1) 4. Explain the Daily nutritional requirements for carbohydrates, protein and fat(C2)	01	--
Unit 17			
Sleep disordered breathing	5. Tell the role of the respiratory therapist in the assessment of patients for potential sleep-disordered breathing. (C1) 1. Explain the expected findings in the assessment of patients with sleep-disordered breathing. (C2) 2. Explain the correlation among sleep apnea, snoring, and excessive daytime sleepiness. (C2) 3. Explain the normal stages of sleep with associated physiologic changes in the cardiopulmonary system. (C1) 4. List the clinical and assessment criteria for obstructive, central, and mixed sleep apnea(C1). 5. Understanding basic treatment options and insurance coverage criteria. (C2)	01	02
Unit 18			
Home care Patient assessment	1. Explain the evolution and advantages of respiratory home care. (C2) 2. Explain the role of the respiratory therapist in home care. (C2) 3. List major tools and resources used in respiratory home care assessment. (C1) 4. Identify the key elements involved in assessing the respiratory home care patient. (C3) 5. Explain respiratory equipment commonly used to assess and treat patients at home. (C2) 6. Explain the purpose and the procedure for developing a plan of care. (C2)	01	02

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	7. Explain strategies for educating patients in the home setting. (C2)		
Unit 19			
Documentation	1. List the general reasons why documentation is important. (C1) 2. Identify the three major types of medical record documentation for respiratory therapists. (C3) 3. Explain the use of the subjective, objective, assessment, and plan method for documentation in the patient's medical record. (C2) 4. Explain the assessment, plan, implementation, and evaluation method and the problem, intervention, and plan method for documentation of patient assessment data. (C2) 5. Explain the federal electronic medical record mandate. (C2)	01	01

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)	13	26
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**52**	**104**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Assignments/Presentations	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x	x				
Quiz / Viva				x		
Assignments/Presentations		x				
End Semester Exam	x	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1.James K Stoller. Wilkins' Clinical Assessment in Respiratory CareISBN-13: 978-0323100298, ISBN-10: 0323100295

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Respiratory Care Equipment**
Course Code	**RES1202**
Academic Year	First Year
Semester	II
Number of Credits	4
Course Prerequisite	Student should have a basic knowledge on respiratory system and the equipment are used to assess respiratory system.
Course Synopsis	1.This module helps to familiarize and understand the basic physics, procedures, and equipment's involved in respiratory care 2.To provide the fundamental knowledge of various equipment's and procedures used in respiratory care 3.To identify and explain the importance of selection of the equipment or a particular procedure in respiratory care

Course Outcomes (COs):
At the end of the course student shall be able to:

CO1	Define the basic physics and principles required for respiratory care equipment's (C1)
CO2	Explain the different respiratory care equipment's used in respiratory care procedures and therapy (C2)
CO3	Explain the different procedures involved in respiratory therapy (C2)
CO4	Indication and complications of selecting the appropriate equipment based on the respiratory care procedures and therapy (C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							x
CO2				x	x			
CO3		x	x					
CO4						x	x	

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**	
		Lecture	**Tutorial**
Unit 1:			
Basic physics for a Respiratory Therapist	1. Compare between kinetic energy and potential energy(C2) 2. Explain the physical and chemical properties of three primary states of matter(C2) 3. Explain why large amount of energy are required to accomplish the changes	1 hour	1 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	associated with solid-liquid-gas phase transitions(C2) 4. Define pressure and explain two devices used to measure it (C1) 5. List the various pressures equivalent for 1 atmosphere(C1) 6. Explain the different laws used in respiratory care(C2) 7. Explain venture and coanda effects and its uses in design of a respiratory care equipment's(C2) 8. Explain different types of flows (C2) 9. Define ohms law(C1)		
Unit 2:			
Principles of infection control	1) Identify the major organisms associated with nosocomial pneumonia (C3) 2) List Four factors that influence the effectiveness of a germicide(C1) 3) Define the terms High level disinfection, intermediate level, and Low level Disinfection(C1) 4) Explain the process of pasteurization and its application to disinfection of respiratory care equipment(C2) 5) Explain quaternary compounds, alcohols acetic acid, glutaraldehyde Hydrogen peroxide, which are used as disinfectants(C2) 6) Name four physical methods commonly used to sterilize medical devices(C1) 7) Identify the infectious risk devices in respiratory care(C3) 8) Explain three components of an effective infection surveillance programme(C2) 8) Compare the standard precautions with transmission based precautions(C2)	1 hour	1 hour
Unit 3:			
Manufacture, storage and Transport of medical Gases	1) Explain the chemical and physical properties of the medical gases used in respiratory care (C2) 2) Explain the medical gas cylinder with its safety precautions (C2) 3) Explain the various cylinder markings, specifications service pressure, serial number etc(C2) 4) List the colour codes used to identify medical gas cylinders(C1) 5) explain the American Standard Safety System,ASSS,pin-index safety system (PISS), and diameter index safety	2 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	system(C2) 6) How to calculate the gas volume remaining in a compressed gas cylinder and estimate the duration of a gas flow based on cylinders guage pressure (C1) 7) Explain the components of bulk oxygen system and liquid oxygen system(C2) 8) Explain the different types of air compressors (C2) 9) Explain a molecular sieve oxygen concentrator and membrane oxygen concentrator (C2) 10) Explain piping system and components of central gas system(C2)		
Unit 4 :			
Administration of medical Gases	1) Explain the single stage regulator and multistage regulators(C2) 2) Explain the components of preset and adjustable regulators(C2) 3) Explain the operational theory of a Thorpe tube flowmeter, a bourdon gauge flowmeter, and a flow restrictor (C2) 4) Explain low flow and high flow oxygen delivery system(C2) 5) Explain the components of High Flow nasal cannula systems in the treatment of hypoxemia(C2) 6) Explain the operational theory of air entrainment devices.(C2) 7) Explain the difference between oxygen blender and oxygen mixers(C2) 8) Explain the physiological effects of hyperbaric oxygen therapy(C2) 9) Explain the appropriate use of inhaled nitric oxide therapy, heliox therapy, and carbogen therapy(C2)	2 hour	2 hour
Unit : 5			
Airway Management Devices and Advanced Cardiac Life Support	1) List the various artificial airway devices used in respiratory care(C1) 2) Explain the ways to displace the tongue to improve gas exchange in a unconscious patient(C2) 3) Explain oropharyngeal and nasopharyngeal airways and technique of insertion of the airways (C2) 4) Explain Endotracheal tube, LMA, combitube,Tracheostomy tube (C2) 4) Explain the procedure of Endotracheal Intubation in Detail(C2) 5) Explain the procedure of insertion of	2 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	tracheostomy tube (C2) 6) Explain the insertion of Laryngeal Mask Airway in detail (C2) 7) Explain the technique of insertion of a combi tube(C2) 8) Explain the complicationsin an intubated patients.(C2) 9) List the equipments necessary for Endotracheal intubation (C1) 10) Explain the working principle of a manual resuscitator(C2) 11) explain Bag and mask ventilation techniques (C2) 12) Explain the ways of confirming Endotracheal tube in place (C2) 13) explain the types of suctioning procedure open vs closed suction (C2)		
Unit : 6			
Humidity and Aerosol Therapy	1) Define humidity, aerosol , (C1) 2) Explain absolute and relative humidity(C2) 3) Explain the mechanism of humidification(C2) 4) List the indications, contraindications and hazards associated with humidity therapy (C1) 5) Explain how various types of humidifier work (C2) 6) Explain the monitoring and maintaining humidity Therapy(C2) 7) Explain the physical characteristic of an aerosol(C2) 8) List the factors that influence aerosol deposition(C2) 9) Explain the indications of aerosol therapy(C1) 10) Explain the optimum technique for administering aerosol- small Volume nebulizer, Large volume nebulizer, meterdose inhaler, Dry powder inhaler. (C2) 11) Explain how pneumatic, Ultrasonic and vibrating mesh aerosol generators work(C2) 12) Explain the criteria for each device selection (C2)	2 hour	2 hour
Unit :7			
Lung ExpansionTherapy	1. List the advantages and disadvantages of using incentive spirometry for postoperative patients(C1)	2 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	2. Explain the principle of Incentive Spirometry(C2) 3. List the indications of intermittent positive pressure ventilation(C1) 4. Explain the PEP device and its use in mobilization of secretions(C2) 5. Explain the theory of four devices that are used in clearance of the secretions by producing High frequency oscillations to the lungs and the chest wall(C2) 6. Explain the mechanical insufflations and exsufflation devices which enhance airway secretions with respiratory muscle weakness or paralysis(C2)		
Unit: 8			
Assessment of pulmonary Function	1) Explain three types of volume collecting spirometers (C2) 2) name three types of tachometers (C1) 3) Explain the types of body plethysmograph(C2) 4) Explain nitrogen washout and helium dilution technique for measurement of FRC and residual volume. (C2) 5) Outline the standards for Lung Function testing established by ATS (C2) 6) Explain oxygen analysers and its use in clinical setting.(C2) 7) Explain the two techniques for monitoring nitrogen oxide in clinical settings.(C2) 8) Explain the normal components of a normal capnogram (C2) 9) Explain the types of calorimetry(C2) 10) identify an abnormal capnograph and possible causes(C3)	2 hour	2 hour
Unit:9			
Assessment of Cardiovascular Function	1) Explain the basic principles of electrocardiography (C2) 2) Explain Normal ECG with a diagram(C2) 3) Explain the correct placement of electrodes for 12 limb lead ECG(C2) 4) Explain the various waves and intervals on a normal ECG (C2) 5) List the most encountered arrhythmia encountered in clinical ECG (C1) 6) Explain Cardiac cycle and its components (C2) 7) Explain the principles of operations of invasive and non-invasive devices used to record the blood pressure.(C2) 8) Explain the various invasive and non	2 hour	2 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	invasive methods to measure cardiac output.(C2)		
Unit:10			
Blood Gas Monitoring	1) Explain the modified Allens Test (C2) 2) Identify the various sites for arterial blood gas sampling(C3) 3) Explain in vitro blood gas analyser(C2) 4) Define the principle of CO oximetry(C1) 5) Explain the advantages and disadvantages of point of care blood gas analysis(C2) 6) Define the law on which pulse oximeter works(C1) 7) Explain the physiological and technical factors that affect pulse oximeter readings (C2) 8) Explain the criteria for identifying four types of acid base disorder(C2)	2 hour	2 hour
Unit:11			
Sleep Diagnostics	1) Explain the various stages of sleep in adults and children (C2) 2)explain the physiological effects of sleep on cardiopulmonary function (C2) 3) list the Indications of polysomnography in sleep study (C1) 4)List the measurements most commonly used during polysomnography.(C1) 5) Define apnea /hypopnea index(C1) 6) Explain obstructive sleep apnea, central sleep apnea and mixed sleep apnea (C2) 7) Explain physiological consequences of obstructive sleep apnea (C2)	1 hour	2 hour
Unit :12			
Introduction to ventilators	1) Explain negative vs positive pressure ventilation(C2) 2) Define pressure control and volume control ventilation(C1) 3)Explain the four phase variables(C2) 4) Explain mandatory spontaneous and assisted breaths (C2) 5) Explain modes of ventilation (C2) 6) Define high frequency ventilation(C1) 7) Explain types of High frequency ventilation (C2)	1 hour	2 hours
Unit: 13			
Mechanical Ventilator	1) List the different company ventilators (C1) 2) Explain the various control parameters in a ventilator (C2) 3) Explain the monitoring and alarm settings	2 hour	1 hour

Content	Competencies	Number of hours	
		Lecture	Tutorial
	in ventilator (C2) 4) Explain the standard modes of ventilation (C2)		
Unit:14:			
Infant and pediatric devices	1) Explain the CPAP delivery devices used in the treatment of infants and paediatrics (C2) 2) List the various modes of ventilator support (C1) 3) Explain the precautions and troubleshooting for the CPAP devices(C2) 4) Explain the controls, monitors, alarm and safety systems on infant and paediatric ventilators(C2)	2 hour	1 hour
Unit 15:			
Transport Home care and Non-invasive ventilator devices	1. Define a transport ventilator(C1) 2. Explain the steps of in hospital transport of a mechanically ventilated patients(C2) 3. List the Indications of the use of non-invasive ventilators (C1) 4. List the complications during the transport of a critically ill patient(C1)	2 hour	2 hour

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)	13	26
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**52**	**104**
Assessment Methods:		
Formative:	**Summative:**	
Unit Test	Mid Semester/Sessional Exam (Theory)	
Quiz	End Semester Exam (Theory)	
Viva		
Assignments/Presentations		

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester / Sessional Examination 1	x	x		
Quiz / Viva			x	x
Assignments	x	x	x	x
Clinical/Practical Log Book/ Record Book	-	-	-	-

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. JM Cairo MOSBYS Respiratory Care Equipment 9th edition; ISBN-10: 9780323096218. 2.Egans Fundamentals of Respiratory Care ,10th edition; *ISBN* 9780323511124
Additional References	1. Branson, Richard D , Respiratory Care Equipment's, 6th edition; ISBN-10: 9780323096218.

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Pulmonary Diagnostics - I**
Course Code	**RES1223**
Academic Year	First Year
Semester	II
Number of Credits	3
Course Prerequisite	Students should have a basic knowledge on respiratory physiology
Course Synopsis	The students will learn about • The basic electrophysiology of heart, standard electrocardiogram (ECG) and recognition of common arrhythmias through it. • The technique of blood sampling for arterial blood gas analysis and interpretation of arterial blood gas reports. • Performance and interpretation of bedside and laboratory pulmonary function tests.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the basic electrophysiology of heart. (C2,P1)
CO2	Identify and explain the fundamentals of a standard electrocardiogram and cardiac arrhythmias. (C2,C3,P1)
CO3	Outline and explain the key procedural elements in obtaining arterial blood samples by means of puncture and indwelling arterial line.(C2,P2)
CO4	Interpret the arterial blood gas reports. (C2,P2)
CO5	Explain the fundamentals of static and dynamic pulmonary function tests and interpret the results of these tests. (C2,P2)
CO6	Explain the terms “provocative tests’ and “post bronchodilator tests” of lung functions.(C2,P2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	×							
CO2		×					×	
CO3				×	×			
CO4		×				×		
CO5			×					×
CO6	×					×		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**	
		Lecture	**Practical**
Unit 1:			
Fundamentals of Electrocardiography	1) Explain the electrical conduction system of the system .(C2)	01	-

Content	Competencies	Number of Hours	
		Lecture	Practical
	2) Explain the classification and conventional lead positions of standard 12-lead ECG. (C2) 3) Explain the standardisation of ECG and calculation of heart rate and voltage criteria. (C2)		
Unit 2:			
Cardiac arrhythmias	1) Identify and explain sinus arrhythmias, sinus bradycardia and sinus tachycardia (C2,C3,P1) 2) Identify and explain supraventricular arrhythmias [atrial flutter and atrial fibrillation].(C2,C3.P1) 3) Identify and explain premature atrial contractions, junctional rhythms and paroxysmal supraventricular tachycardia. (C2,C3,P1) 4) Identify and explain ventricular arrhythmias [premature ventricular complexes, ventricular tachycardia and ventricular fibrillation], myocardial ischaemia and infraction. (C2,C3,P1)	02	02
Unit 3			
Indications, sampling and measurement of blood gases	1) Identify the reference ranges for both arterial blood gas and oximetry parameters.(C2,P1) 2) Identify the indications for blood gas and oximetry analysis.(C2,P1) 3) **Compare** between invasive and non-invasive methods for measuring blood gas and oximetry parameters.(C2,P2) 4) Outline and explain the key procedural elements in obtaining arterial blood samples by means of puncture and indwelling arterial line.(C2,P2)	02	02
Unit 4			
Interpretation of ABG reports: assessment of oxygenation	1) Explain the factors affecting haemoglobin saturation to interpretation of oximetry data.(C2,P1) 2) Relate common indices of oxygenation to assess the cause and severity of hypoxemia.(C2,P2)	01	01
Unit 5			
Interpretation of ABG reports: assessment of ventilation and acid base balance	1) Explain the factors affecting the common ventilator indices.(C2,P1) 2) Relate common indices of ventilation to assess the cause and type of respiratory failure. (C2,P2)	01	01

Content	Competencies	Number of Hours	
		Lecture	Practical
	3) Relate the Henderson-Hasselbalch equation to changes in PCO_2 and HCO_3 to pH. (C2,P2)		
Unit 6			
Systematic interpretation of ABG report: Simple, combined and mixed acid-base disturbances	1) Interpret arterial blood gas and/or oximetry data.(C2,P2) 2) Explain the common causes, compensatory mechanisms, and expected blood gas findings seen in simple respiratory and metabolic acid-base disorders.(C2,P1) 1) Explain the common causes and expected blood gas findings seen in combined and mixed acid-base disorders.(C2,P1)	01	01
Unit 7			
Valid measurement and use of blood gas data	1) Identify the common pre-analytic, analytic and post-analytic errors in blood gas analysis.(C3) 2) Summarize methods used to assuring valid measurement and use of blood gas data.(C2,P2)	01	01
Unit 8			
Indications for pulmonary function testing.	1) Classify pulmonary function tests according to specific purposes.(C2) 2) List indications for spirometry, lung volumes, and diffusing capacity.(C1) 3) Identify at least one obstructive and one restrictive pulmonary disorder.(C3) 4) Relate pulmonary history to indications for performing pulmonary function tests.(C2)	01	-
Unit 9			
Spirometry	1) Relate whether spirometry is acceptable and repeatable.(C2,P1) 2) Identify the airway obstruction using vital capacity (VC) and forced expiratory volume in one second (FEV1).[C3,P2) 3) Compare between obstruction and restriction as causes of reduced VC.[C2,P2] 4) Relate whether there is a significant response to bronchodilators.(C2,P1)	02	03
Unit 10			
Diffusion capacity tests	1) Identify the steps for performing the single-breath DLCO.(C3,P1) 2) List at least two criteria for an	01	02

Content	Competencies	Number of Hours	
		Lecture	Practical
	acceptable single-breath DLCO test.(C1,P1) 3) Explain why DLCO is often reduced in emphysema.(C2,P1)		
Unit 11			
Lung Volumes, Airway Resistance, and Gas Distribution Tests	1) Explain the measurement of lung volumes using gas dilution/washout methods. (C2,P1) 2) Explain two advantages of measuring lung volumes using the body plethysmograph. (C2,P1) 3) Relate residual volume and total lung capacity from FRC and the subdivisions of VC. (C2,P2) 4) Identify a restricted disease process from measured lung volumes. (C3,P1) 5) Explain the measurement of airway resistance using the body plethysmograph. (C2,P1)	02	01
Unit 12			
Ventilation and Ventilatory Control Tests	1) Explain the measurement of tidal volume and minute ventilation. (C2,P1) 2) Identify at least two causes of decreased minute ventilation. (C3,P2) 3) How to Calculate the VD/VT ratio, using the modified Bohr equation. (C1,P2)	01	02
Unit 13			
Blood Gases and Related Tests	1) Explain how pH and PCO_2 are used to assess acid-base status. (C2,P1) 2) Interpret PO_2 and oxygen saturation to assess oxygenation. (C2,P2) 3) Identify the appropriate procedure for obtaining an arterial blood gas specimen. (C3,P2) 4) List situations in which pulse oximetry can be used to evaluate a patient's oxygenation. (C1,P2)	-	02
Unit 14			
Cardiopulmonary Exercise Testing	1) identify an appropriate exercise protocol based on the reason for performing the test. (C3,P2) 2) Identify the ventilatory/anaerobic threshold. (C3,P1) 3) Explain two methods for measuring ventilation, oxygen consumption, and carbon dioxide production during exercise. (C2,P2) 4) Identify indications for terminating a cardiopulmonary stress test. (C3,P3)	02	02

Content	Competencies	Number of Hours	
		Lecture	Practical
Unit 15			
Broncho provocation Testing,	1) Explain two methods of performing bronchial challenge tests. (21,P1) 2) Identify a positive response to a methacholine challenge test. (C3,P2) 3) List two indications for broncho-provocation testing. (C1,P1) 4) How to Select an appropriate protocol to test for exercise-induced asthma. (C1,P2)	02	01
Unit 16			
Specialized Test Regimens	1) Explain the indications for respiratory muscle strength testing. (C2,P1) 2) Identify the normal range for exhaled nitric oxide values. (C3,P1) 3) List two indications for preoperative pulmonary function testing. (C1,P1) 4) Identify the difference between open- and closed-circuit calorimetry. (C3,P2)	02	01
Unit 17			
Pulmonary Function Testing Equipment	1) Explain two types of volume-displacement spirometers. (C2,P1) 2) List at least two principles used by flow-sensing spirometers to measure volume. (C1,P1) 3) Identify a directional breathing valve for a specific testing situation. (C3,P2) 4) Identify the types of gas analysers used for diffusing capacity and dilutional lung volume tests. (C3,P2) 5) Explain the function of commonly used gas conditioning devices. (C2,P1)	02	02
Unit 18			
Quality Systems in the Pulmonary Function Laboratory	1) Explain the twelve quality system essentials and path of workflow for pulmonary function testing. (C2,P1) 2) Explain three types of mechanical quality control devices. (C2,P2) 3) Perform and evaluate spirometry linearity testing on a flow-based system. (C3,P2) 4) Relate whether spirometers, single-breath diffusing equipment, a plethysmograph, or a blood gas analyser is “in control” using a control chart.(C2,P2)	02	02

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	78
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical	26	-
Revision		
Assessment		
Total	**52**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam
Quiz	End Semester Exam
Viva	--
Assignments/Presentations	Record Book
Clinical/Practical Log Book/ Record Book	Record book

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	×	×	×			
Quiz / Viva	×	×	×	×	×	×
Assignments/Presentations					×	×
Clinical/Practical Log Book/ Record Book	×	×	×	×	×	×
Any others: WPBA						
End Semester Exam	×	×	×	×	×	×

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1) Hampton J, Hampton J. The ECG Made Easy.9th Edition Elsevier Health Sciences; 2019 Feb 12. ISBN 9780702074578, 9780702075049. 2) James K Stoller. Wilkins' Clinical Assessment in Respiratory CareISBN-13: 978-0323100298, ISBN-10: 0323100295 3) Mottram C. Ruppel's Manual of Pulmonary Function Testing-11th edition. Elsevier Health Sciences; ISBN**:** 9780323356251

SEMESTER - III

COURSE CODE	:	COURSE TITLE
MCB2103	:	Microbiology
PAT2103	:	Pathology
RES2101	:	Pulmonary Diagnostics- II
RES2102	:	Pediatric Respiratory Care
RES2103	:	Pulmonary Diseases
RES2131	:	Clinical- I
*** ****	:	Open Elective - I

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Microbiology**
Course Code	**MCB2103**
Academic Year	Second Year
Semester	III
Number of Credits	3
Course Prerequisite	Nil
Course Synopsis	1. This course focuses on acquiring the knowledge pertaining to basics of medical microbiology, host immune response, common infectious diseases prevalent in India, healthcare associated infections and aseptic measures to prevent infections

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the process of disease causation by infectious agents and appraise the role of microbiology laboratory in the diagnosis, management and control of infectious diseases with an emphasis on diseases prevalent in India (C2)
CO2	Explain the development of immune response, its relation to infection and other diseases with an immunological basis (C2)
CO3	Explain the implications of antibiotic susceptibility (C2)
CO4	Understanding the principles of asepsis and infection control in clinical practice (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4	x	x						

Course Content and Outcomes:

Content	Competencies	**Number of Hours**
Introduction To Medical Microbiology	i) Historical introduction to microbiology a. Describe the contributions of: (C1) • Louis Pasteur • Robert Koch ii) Classify the microorganisms (C2) iii) List the branches of microbiology and their significance (C1)	1
Bacterial Anatomy And Classification	i) Explain the bacterial cell structure, organelles and their functions (C2) ii) Explain the bacterial envelope of gram positive and gram negative bacteria (C2) iii) Explain the following bacterial structure and	2

Content	Competencies	**Number of Hours**
	their significance (C2) a. Cytoplasm b. Ribosomes c. Mesosomes d. Nucleoid e. Inclusion granules f. Flagella g. Pili h. Capsule i. Plasmid j. Spores iv) Classify bacteria based on morphology and nutrition (C2)	
Growth, Cultivation And Identification Of Bacteria	i) Explain the following: (C2) a. Bacterial growth curve b. Cultivation of bacteria • Culture media • Culture methods c. Identification of bacteria • Microscopy and Staining techniques • Biochemical reactions • Serology • Molecular techniques	2
Antimicrobial Susceptibility	i) Explain the disc diffusion methods – Kirby Bauer's and E - test (C2)	1
INTRODUCTION TO VIROLOGY, MYCOLOGY & PARASITOLOGY	i) Explain the following: (C2) a. General features of viruses b. Virion structure c. Classification of viruses d. Diagnosis of viral diseases e. General properties and classification of fungi (morphological classification) f. Infections produced by fungi and their diagnosis g. General properties and classification of parasites h. Parasitic infections and their diagnosis	3
Sterilization And Disinfection	i) Classify sterilization methods (C2) ii) Explain the following (C2) a. Physical: Heat b. Sterilization by heat c. Dry heat sterilization – • Hot air oven and incinerator d. Moist heat sterilization • Below 100 ^{o}C, • At 100 ^{o}C • Above 100 ^{o}C e. Classification of disinfectants used in hospital and their mechanism of action	3

Content	Competencies	**Number of Hours**
Infection & Immunity	i) Define infection (C1) a. List the types, sources, routes and spread of infectious diseases (C1) ii) Define and classify immunity (C1) iii) Explain the following: (C2) a. Types of immunity b. Types of vaccines iv) List the immunization schedule in India (C1)	2
Antigen & Antibody	i) Define antigen (C1) ii) Define(C1) and classify antibodies (C2) iii) Explain the following (C2) a. Functions of antibodies b. Diagnostic importance of antigen-antibody reactions • Agglutination • Immunofluorescence • ELISA	1
Immune Response	i) List the cells of immune system (C1) ii) Explain the following: (C2) a. Humoral Immunity – Primary and secondary immune response b. Cell mediated Immunity -Constituents and significance	2
Hypersensitivity	i) Define (C1) and classify hypersensitivity (C2) ii) Explain the following: (C2) a. Immediate hypersensitivity • Mechanisms and mediators of Anaphylaxis and atopy b. Cytotoxic hypersensitivity - Mechanism and associated disorders c. Immune complex hypersensitivity- • Arthus reaction, serum sickness and immune complex diseases d. Delayed type hypersensitivity- Mechanism and clinical importance of • Contact dermatitis and tuberculin type hypersensitivity	2
Autoimmunity	i) Define autoimmunity (C1) ii) Explain the mechanisms of autoimmunity (C2) iii) List the diseases involving predominantly one type of cell or organs (C1) iv) List the diseases involving multiple organs (systemic) (C1)	1
Healthcare Associated Infections	i) List the common Healthcare associated infections (C1) ii) Explain the following: (C2) a. Causes b. Sources	1

Content	Competencies	**Number of Hours**
	c. Routes of spread d. Host risk factors e. MRSA and its importance f. Prevention g. Investigation	
Standard Precautions And Overview Of Laboratory Diagnosis Of Microbial Infections	i) Explain the following (C2) a. Hand hygiene b. Personal protective equipment (PPE) c. Respiratory hygiene d. Sharp safety e. Sterile instruments and devices. f. Clean and disinfected environmental surfaces ii) Explain laboratory diagnosis of microbial infections (C2) a. Specimen Collection b. Specimen transport c. Specimen processing and handling d. Identification of microbes	3
Respiratory Tract Infections	i) Bacterial pneumonia a. List the causative agents associated (C1) b. Explain the pathogenesis and laboratory diagnosis of the following organisms (C2) • Streptococcus pneumoniae • Haemophilus influenzae • Klebsiella pneumoniae c. Describe the preventive measures(C1) ii) Viral pneumonia a. List the causative agents (C1) • Influenza b. Explain the etio-pathogenesis (C2) c. Explain the lab diagnosis (C2) d. Describe the preventive measures(C1) iii) Tuberculosis a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the lab diagnosis (C1) **d.** Describe the preventive measures (C1)	3
CNS Infections	i).Acute bacterial meningitis a. List the causative agents (C1) b. Explain the pathogenesis(C2) c. Explain the laboratory diagnosis(C2) d. Describe the preventive measures (C1) ii). Poliomyelitis a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the preventive measures (C2)	3

Content	Competencies	**Number of Hours**
	iii). Tetanus a. Describe the general properties of etiological agent (C1) b. Explain the pathogenesis (C2) c. Explain the laboratory diagnosis (C2) d. Describe the preventive measures (C1)	
Skin & Muscle Infections	i) Explain the etio-pathogenesis and laboratory diagnosis of following agents: (C2) a. Staphylococcus aureus b. Streptococcus pyogenes c. Clostridium perfringens	3
Cardiovascular System Infections	i) Infective endocarditis and Acute Rheumatic Fever (ARF) a. List the etiological agents (C1) b. Explain the pathogenesis and laboratory diagnosis of infective endocarditis and ARF (C2) c. Describe the preventive measures of ARF(C1) ii) Pyrexia of Unknown Origin (PUO) a. Define (C1) and classify (C2) b. Explain the investigation of classical PUO (C2)	2
GIT Infections	i) List the agents causing food poisoning and food associated infections (C1) ii) Explain the etio-pathogenesis and laboratory diagnosis of thefollowing:(C2) a. Escherichia coli diarrhoea b. Cholera c. Bacillary dysentery d. Enteric fever iii) Describe the preventive measures of cholera and enteric fever (C1) iv) Explain the morphology, transmission, clinical features and laboratory diagnosis of following parasites (C2) a. Entamoeba histolytica b. Ascaris lumbricoides **c.** Ancylostoma duodenale v) Viral hepatitis a. List the etiological agents (C1) b. Explain the transmission, pathogenesis, laboratory diagnosis and prevention of HBV infection(C2)	6
Urogenital Infection	**i) URINARY TRACT INFECTION** a. List the etiological agents (C1) b. List predisposing factors – Host factors and Microbial factors (C1) c. Explain the clinical features and laboratory diagnosis (C2)	2

Content	Competencies	**Number of Hours**
	ii) SEXUALLY TRANSMITTED DISEASES a. List the organisms causing STDs (C1) b. Human immunodeficiency virus infections • Explain general properties, pathogenesis, clinical features complications and laboratory diagnosis (C2)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):							
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**					
Lecture	40	120					
Seminar							
Small group discussion (SGD)							
Self-directed learning (SDL)							
Problem Based Learning (PBL)							
Case Based Learning (CBL)							
Clinic							
Practical							
Revision							
Assessment	3	9					
Total	**45**	**129**					
Assessment Methods:							
Formative:	**Summative:**						
Unit Test- Nil	Mid Semester- First Sessional Examination SEQ (theory) Second Sessional Examination – MTF (theory)						
Quiz - Nil	**University Examination – SEQ theory**						
Mapping of Assessment with COs:							
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**	
Mid Semester / Sessional Examination 1	x	x	x	x	-	-	
Sessional Examination 2	x	x	x	x	-	-	
End Semester / University Exam	x	x	x	x	-	-	
Feedback Process:	**Mid-Semester Feedback**						
	End-Semester Feedback						
Main Reference:	1. Textbook of Microbiology for Dental students, Prof: C.P. Baweja 2. Medical Parasitology, D. R. Arora and D. Arora						
Additional References	Review of Medical Microbiology and Immunology by Warren Levinson, 15th Edition						

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Pathology**
Course Code	**PAT2103**
Academic Year	Second Year
Semester	III
Number of Credits	3
Course Prerequisite	Nil
Course Synopsis	This module is devoted to the structural and functional changes in cells, tissues and organs that underlie disease. Pathology examines diseases and their mechanisms including the what, when, where, why and how of disease. It forms an integral part of clinical medicine and allied streams, as it is required to understand the symptoms and signs of disease, the modes of diagnosis and the rationale for clinical care.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	To demonstrate their understanding of the basic principles of pathology both as a medical science and as a clinical discipline (C2)
CO2	To explain the disease mechanisms, which include basic concepts, inflammation and neoplasms of specific systems and organs, and haematological conditions and understand the significance of the mechanisms in the health profession education (C2)
CO3	To use the principles of laboratory tests in the diagnosis of diseases (C4)
CO4	To apply the knowledge of Pathology to clinical situations for understanding the disease process along with clinical manifestations and relate the relevance of knowledge of pathology to the practice of health profession (C4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x	x						
CO4	x	x						

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Basic concepts and general pathology		
Introduction to pathology & basic terminologies	**Terminologies** 1. Introduction to pathology 2. Recognise the relevance of Pathology (C2) 3. Define the basic terminologies and branches of Pathology (C1)	**1**

Content	Competencies	Number of Hours
	a. Aaetiology b. Pathogenesis c. Pathological and clinical manifestations d. Complications & sequelae e. Prognosis f. Syndrome g. Lesion 4. Explain the scope of the following branches of pathology: (C2) a) Histopathology b) Cytopathology c) Haematology	
Cell injury & adaptation	**Cell adaptation** Define cell growth, differentiation and cell adaptation (C1) Describe the various cell adaptations with examples (C2) a) Hypertrophy b) Hyperplasia c) Atrophy d) Metaplasia e) Dysplasia **Necrosis** 1. Define necrosis(C1) 2. Describe the various types of necrosis with clinical examples (C2) a) Coagulative necrosis b) Colliquative necrosis/ Liquefactive necrosis c) Caseous necrosis d) Fibrinoid necrosis e) Fat necrosis f) Gangrene	**2**
Inflammation	Define inflammation. List the types with examples. (C1) Acute inflammation 1. Define acute inflammation. (C1) 2. Describe the causes and cardinal signs of acute inflammation. (C2) 3. Explain the vascular of acute inflammation. (C2) 4. Describe the cellular events in acute inflammation. (C2) 5. Explain the sequelae of acute inflammation. (C2) 6. Explain the beneficial, harmful and systemic effects of acute inflammation. (C2) Chronic inflammation 1. Define chronic inflammation. (C1) 2. List the causes of chronic inflammation. (C1) 3. Describe the macroscopic and microscopic features in chronic inflammation. (C2) 4. List the cells in chronic inflammation. (C1)	**3**

Content	Competencies	Number of Hours
	5. Define granulomatous inflammation. (C2) 6. List the components of a granuloma and describe its morphology (C2) 7. List the causes of granulomatous inflammation. (C1)	
Healing & repair	Wound healing 1. Define granulomation tissue and describe the formation of granulation tissue. (C2) 2. Describe the following: (C2) a. Healing by first intention. b. Healing by second intention. c. Wound organization, contraction and scarring. 3. Explain the factors which modify (influence) healing and repair. (C2)	**1**
Fluid & haemodynamic derangements	Oedema 1. Define oedema. (C1) 2. List the types of oedema. (C1) 3. Describe the pathogenesis and clinical features of the different types of oedema. (C2) Shock 1. Define shock. (C1) 2. List the various types of shock. (C1) 3. Describe the pathogenesis of septic and hypovolemic shock. (C2) Thrombosis (Arterial & Venous) 1. Define thrombosis. (C1) 2. Describe the factors influencing pathogenesis of thrombosis. (C2) 3. List causes of arterial and venous thrombosis. (C1) 4. List the fates of thrombus. (C1) Embolism 1. Define embolism. List the types of embolism with examples. (C1) 2. Describe the clinicopathologic consequences of pulmonary thromboembolism (C2) Infarction 1. Define infarction. (C1) 2. Describe the types and clinical significance of infarction. (C2)	**4**
Neoplasia	1. Define neoplasia (C1) 2. Describe the nomenclature of tumours with examples (C2) 3. Define dysplasia and anaplasia (C1) 4. Describe the differences between benign and malignant tumours (C2) 5. Define carcinogenesis. List the types of carcinogens with example of each (C1) 6. Describe the aetiology & predisposing factors of tumours (C2) 7. Define metastasis. (C1)	**4**

Content	Competencies	Number of Hours
	8. Describe the routes of metastasis with examples (C2) 9. Describe the prognostic factors of tumours with emphasis on staging & grading (C2) 10. Describe the various modalities for diagnosis of cancer (C2)	
Infectious diseases	Tuberculosis 1. Describe the aaetiology and mode of transmission of tuberculosis (C2) 2. Describe the clinical features of tuberculosis. (C2) 3. Describe the morphology of primary, secondary and miliary tuberculosis. (C2) Leprosy 1. List the aetiological factors of leprosy (C1) 2. Classify leprosy (C1) 3. Describe the morphology of lepromatous and tuberculoid leprosy (C2)	**4**
Genetics	1. Describe the basic concepts of genetics (C2) 2. Define with suitable examples (C1) a. Autosomal dominant b. Autosomal recessive c. X-linked recessive d. Chromosomal abnormalities 3. Define karyotyping (C1)	**1**
Unit 2: Haematology		
Diseases of RBCs	1. Define anaemia (C1) 2. Classify anaemia based on aaetiology and morphology (C4) 3. Describe the clinical features, aaetiology and basic investigation of (C2) a. Nutritional anaemias(B12/folate deficiency, iron deficiency) b. Haemolytic anaemias(thalassemia, sickle cell anaemia)	**3**
Bleeding disorders	1. List the types of bleeding disorders (C1) 2. Describe the clinical features and basic investigation of haemophilia (C2) 3. List the causes of thrombocytopenia (C1) 4. Describe the clinical features and basic investigation of immune thrombocytopenia (C2)	**1**
Diseases of WBC	1. Define leukemia (C1) 2. List the types of leukemia (C1) Acute Leukaemia (AML, ALL) 1. Describe the clinical features of AML & ALL.(C2) 2. Describe the laboratory diagnosis of AML and ALL (C2) **Chronic leukaemia (CML, CLL)** 1. Describe the clinical features, blood findings	**2**

Content	Competencies	Number of Hours
	and chromosomal abnormality in CML (C2) 2. Describe the clinical features and laboratory diagnosis of CLL (C2)	
Unit 3: Systemic Pathology		
Blood vessels & heart	**Hypertension** 1. Define hypertension (C1) 2. Classify hypertension (C4) 3. Describe the effects of hypertension on various organs (C2) **Atherosclerosis** 1. Define atherosclerosis (C1) 2. List the sites of involvement by atherosclerosis (C1) 3. Describe the predisposing factors, complications & clinical effects of atherosclerosis (C2) **Ischemic heart disease/Coronary artery disease** 1. Define ischemic heart disease (C1) 2. Describe the clinical spectrum of the disease (with reference to angina and myocardial infarction) (C2) **Aneurysm** 1. Define aneurysm (C1) 2. List the causes, types and complications of aneurysms (C1) **Rheumatic heart disease** 1. Define rheumatic heart disease (C1) 2. Describe its aaetiology & clinical features (C2) **Cardiac failure** 1. Define cardiac failure (C1) 2. List the causes of cardiac failure (C1) 3. Describe its pathophysiology & clinical features (C2)	**5**
Respiratory system	**Pneumonia** 1. Define pneumonia (C1) 2. List the types of pneumonia(C1) 3. Describe the aetiology and clinical features of pneumonia (C2) **Chronic obstructive airway disease** 1. Define chronic obstructive airway disease. (C1) 2. List the types of chronic obstructive airway disease.(C1) **Emphysema** 1. Define emphysema(C1) 2. List the types of emphysema (C1) 3. Describe the aetiology and clinical features of emphysema (C2) **Chronic bronchitis** 1. Define chronic bronchitis (C1)	**4**

Content	Competencies	Number of Hours
	2. Describe the aetiology and clinical features of chronic bronchitis (C2) **Bronchiectasis** 1. Define bronchiectasis (C1) 2. List the types of bronchiectasis. (C1) 3. Describe the aetiology and clinical features of bronchiectasis (C2) **Asthma** 1. Define asthma (C1) 2. List the types of asthma (C1) 3. Describe the aetiology and clinical features of asthma (C2) **Pneumoconiosis** 1. Define pneumoconiosis (C1) 2. List the types of pneumoconiosis (C1) **3.** Describe the aetiology and clinical features of pneumoconiosis (C2)	
Gastrointestinal tract & liver	**Gastric & duodenal ulcers** 1. Definition gastric and duodenal ulcer (C1) 2. Describe the aetiology, gross pathology and clinical features of gastric and duodenal ulcer (C2) **GIT malignancies** 1. List the types of common GIT malignancies (C1) 2. Describe their predisposing factors & clinical features (C2) **Jaundice** 1. Define jaundice (C1) 2. List the types of jaundice with examples (C1) **Viral hepatitis** 1. Describe the aetiology of viral hepatitis (C2) 2. List the modes of infection (C1) 3. Describe the clinical features of viral hepatitis(C2) **Cirrhosis of liver** 1. Define cirrhosis (C1) 2. List the causes of cirrhosis (C1) **Liver failure** 1. Define liver failure (C1) 2. List the causes of liver failure (C1) 3. Describe its pathophysiology & clinical features (C2)	**4**
Renal system	Define nephrotic syndrome & nephritic syndrome with suitable examples (C1) **Renal failure** 1. Define renal failure (C1) 2. List its types & describe the clinical features (C2)	**1**
Endocrine system	1. Define hyperthyroidism & hypothyroidism (C1) 2. Describe the causes, clinical features and laboratory diagnosis of hyperthyroidism and	**2**

Content	Competencies	Number of Hours
	hypothyroidism (C2) 3. Describe the types, causes & clinical features of goitre (C2) Describe types, clinical features, complications & laboratory diagnosis of diabetes (C2)	
Nervous system	Define Cerebrovascular diseases (C1) Describe its causes and clinical features (C2)	**1**
Musculoskeletal system	**Fracture** 1. Define fracture (C1) 2. List the types of fracture (C1) 3. Describe the process of fracture healing (C2) 4. List the factors influencing fracture repair (C1) **Osteomyelitis** 1. Define osteomyelitis (C1) 2. Describe the aetiology, types and clinical features of osteomyelitis (C2) 3. Define and list the clinical features of Rheumatoid arthritis, osteoarthritis and osteoporosis (C1)	**2**

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-
Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**45**	**135**

Assessment Methods:	
Formative:	**Summative:**
Unit Test - Nil	1st Sessional Exam - SEQ (theory) 2nd sessional exam - MTF (theory)
Quiz - Nil	University exam – SEQ (theory)
Viva - Nil	Viva - Nil
Assignments/Presentations	Record Book - Nil
Clinical assessment (OSCE, OSPE, WBPA)	- Nil
Clinical/Practical Log Book/ Record Book	- Nil

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester /Sessional Examination 1	x	x	x	x		
Sessional Examination 2	x	x	x	x		
End Semester/University Exam	x	x	x	x		
Feedback Process:	Mid semester feedback End-Semester Feedback					
Main Reference:	1. Essential Pathology for Dental students, Harsh Mohan, 3rd edition, 2010 Jaypee. 2. General and systemic pathology, JCE Underwood and S S Cross, 7th edition, 2018, Churchill Livingstone.					
Additional References						

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Pulmonary Diagnostics - II**
Course Code	**RES2101**
Academic Year	Second Year
Semester	III
Number of Credits	2
Course Prerequisite	Basic knowledge of Pulmonary Diagnostics
Course Synopsis	The students will learn about - The chest x-ray- interpretation, recognition and explain typical chest x-ray features of various pulmonary disease processes. - The hemodynamic assessment in critical care.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Identify the information obtained from a chest radiograph.(C1)
CO2	Recognise the uses and limitations of chest radiographs in ICU.(C1)
CO3	Explain various views used in chest radiography.(C1)
CO4	Interpret the chest radiograph systematically and list the abnormalities noticed in various cardiopulmonary disease processes.(C2)
CO5	Explain the indications, procedure of catheter placement, interpretation of waveforms and potential complications of arterial cannulation and central venous pressure monitoring.(C2)
CO6	Explain the indications, procedure of catheter placement, interpretation of waveforms and potential complications of pulmonary artery pressure monitoring.(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2		x		x				
CO3		x	x					
CO4							x	x
CO5					x			x
CO6						x	x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**	
		Lecture	**Tutorial**
Unit 1:			
How to look at a chest x-ray?	1) Define the basic interpretation of a chest X-ray.(C1) 2) Explain and identify the factors affecting the technical quality of a chest x-ray.(C2)	01	01

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	3) Explain the method to look at the PA film. (C2) 4) Explain the method to look at the lateral film. (C2)		
Unit 2:			
Localizing lesions	1) Explain the correct placement of the lungs and the heart on chest X-ray.(C2) 2) Infer the abnormalities of the lungs and heart structures on a chest radiograph.(C2)	01	-
Unit 3:			
The white lung field	1) Explain and identify the chest X-ray features of the following disease conditions: .(C2) • Pleural effusion • Collapse • Pneumonectomy • Consolidation • Asbestos plaques • Mesothelioma • The coin lesion • Cavitating lung lesions • Left ventricular failure • Bronchiectasis • Fibrosis • Chickenpox pneumonia • Miliary shadowing	01	02
Unit 4			
The black lung field	1) Explain and identify the chest X-ray features of the following disease conditions: (C2) • COPD • Pneumothorax • Tension pneumothorax • Pulmonary embolus.	01	02
Unit 5			
The abnormal hilum	1) Explain the Chest x-ray features of the following: (C2) • Unilateral hilar enlargement • Bilateral hilar enlargement.	01	01
Unit 6			
The abnormal heart shadow	1) Explain and identify the Chest x-ray features of the following: (C2) • Atrial septal defect • Mitral stenosis • Left ventricular aneurysm	01	-

Content	Competencies	Number of Hours	
		Lecture	Tutorial
	• Pericardial effusion.		
Unit 7			
The widened mediastinum	1) Explain the Chest x-ray features of the following: (C2) • The aortic aneurysm • Widened mediastinal structures.	01	-
Unit 8			
Abnormal ribs and soft tissues	1) Explain the Chest x-ray features of the following(C2) • Metastatic deposits • Surgical emphysema	01	01
Unit 9			
The hidden abnormality	1) Explain the Chest x-ray features of the Pancoast's tumour.(C2)	01	-
Unit 10			
Chest CT scan	1. Explain the various aspects of chest CT scan, views and interpretation,(C2)	01	-
Unit 11			
Arterial pressure monitoring	1) List the Indications for placing an Arterial line. (C1) 2) Explain the common insertion sites. (C2) 3) Explain the monitoring equipment set-up.(C2) 4) Explain the procedure for placement of the catheter.(C2) 5) Interpret the arterial pressure waveforms.(C2) 6) Explain and interpret the pressures measured.(C2) 7) List the potential complications.(C1)	01	02
Unit 12			
Central venous pressure monitory	1) List the Indications for placing a CVP catheter.(C1) 2) Explain the catheter description and insertion sites.(C2) 3) Explain the procedure for placement of the catheter.(C2) 4) Interpret the CVP waveform.(C2) 5) Interpret the pressures measured. (C2) 6) Explain the relationship of CVP to left and right ventricular function.(C2) 7) List the potential complications.(C1)	01	02

Content	Competencies	Number of Hours	
		Lecture	Tutorial
Unit 13			
Pulmonary artery pressure monitoring	1) List the Indications for placing a pulmonary artery catheter.(C1) 2) Explain the catheter description and insertion sites.(C2) 3) Explain the procedure for placement of the catheter.(C2) 4) Interpret the pulmonary artery waveforms.(C2) 5) Interpret the pressures measured.(C2) 6) Explain the relationship between pulmonary artery diastolic pressure and pulmonary artery wedge pressure (PAWP).(C2) 7) Explain the techniques for obtaining an accurate PAWP reading.(C2) 8) Explain the relationship between transmural pressure and PAWP.(C2) 9) Explain the effect of positive end-expiratory pressure on PAWP measurements.(C2) 10) List the potential complications of using the pulmonary artery catheter.(C1) 11) Outline the key interventions recommended to minimize central line–associated bloodstream infections (the central line bundle)(C2)	01	02

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	13	26
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**26**	**52**

Assessment Methods:							
Formative:			**Summative:**				
Unit Test			Mid Semester/Sessional Exam				
Quiz			End Semester Exam				
Viva			Viva				
Assignments/Presentations			Record Book				
Mapping of Assessment with COs:							
Nature of Assessment		**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1		x	x	x			
Quiz / Viva					x	x	x
Assignments/Presentations		x	x	x	x	x	x
End Semester Exam		x	x	x	x	x	x
Feedback Process:	Mid-Semester Feedback						
	End-Semester Feedback						
Main Reference:	1. Corne J, Kumaran M. Chest X-Ray Made Easy 4th edition. Elsevier Health Sciences; ***ISBN*** 9780702054990 2. Irwin RS, Rippe JM, editors. Irwin and Rippe's intensive care medicine, 7th edition, ISBN 9780781791533						
Additional References	**3.** James K Stoller. Wilkins' Clinical Assessment in Respiratory CareISBN-13: 978-0323100298, ISBN-10: 0323100295						

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Paediatric Respiratory Care**
Course Code	**RES2102**
Academic Year	Second Year
Semester	III
Number of Credits	3
Course Prerequisite	NIL
Course Synopsis	1. This module is an introduction to fundamentals behind the pediatric respiratory care 2. Understand about the assessment and monitoring of pediatric patient 3. Understand about the different pediatric respiratory disorders. 4. Outlines the management of different respiratory disorders

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the fetal lung development and the gas exchange (C2)
CO2	Explain the assessment and monitoring of pediatric patients (C2)
CO3	Compare and contrast the pathophysiology, etiology and clinical features of different respiratory disorders (C2)
CO4	Make use of appropriate diagnostic procedure to identify respiratory disorders among pediatric population(C3)
CO5	Explain in detail the management strategy of different respiratory disorders (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2			x		x			
CO3		x		x				
CO4						x		x
CO5						x	x	

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**
Unit 1:		
Fetal lung development	1. List the five stages of fetal lung development and the gestational age at which they occur (C1) 2. Explain the key steps of each stage of fetal development (C2) 3. Explain the several conditions that lead to abnormal lung development and injury (C2) 4. Explain the role of the type II pneumocyte in	2 hour (lecture)

Content	Competencies	Number of hours
	surfactant Production(C2) 5. Explain the various physiological functions of surfactant (C2)	
Unit 2:		
Fetal gas exchange and circulation	1. Name the three fetal shunts and explain their role during fetal circulation (C1) 2. Explain the direction of blood flow and relative vascular pressures in the placenta, umbilical vein, three fetal shunts, right-side heart chambers, left-side heart chambers, pulmonary artery, lungs, aorta, and umbilical arteries (C2) 3. Outline the cardiac and pulmonary sequences of events that occur when transitioning from fetal to extra uterine life, including the changes in fetal shunts (C2)	1 hour
Unit 3:		
Examination and assessment of the neonatal and paediatric patient	1. List steps for initial stabilization of the newborn (C1) 2. Explain the Apgar scoring system (C2) 3. List critical vital signs to be evaluated as part of the newborn's initial physical examination (C1) 4. Explain criteria for determining whether an infant is displaying apneic spells(C2) 5. List the signs and symptoms of respiratory distress in the newborn(C1) 6. Explain the technique for rapid identification of a pneumothorax in a newborn (C2) 7. List the elements of a basic neurological examination in the newborn (C1) 8. List the differential diagnosis of a child's respiratory condition (C1)	2 hour
Unit 4 :		
Pulmonary function testing and bedside pulmonary mechanics	1. Define the terminology and various abbreviations used in describing specific aspects of interpreting pulmonary function tests (C1) 2. Identify specific techniques used to elicit acceptable and repeatable results in children when performing pulmonary function tests(C3) 3. Explain the special challenges specific to neonates, infants, and children when performing PFT or assessing respiratory function(C2) 4. Explain the standard and alternative instrumentation techniques available for pulmonary function testing of the newborn and the child (C2) 5. Compare the characteristics of the infant, child, and adult chest wall and pulmonary mechanics that affect correct interpretation of the pulmonary function data(C2)	2 hour

Content	Competencies	Number of hours
	6. Explain the various techniques available for measuring airway function and lung function in both infants and children(C2) 7. Explain the methods used to challenge, or provoke, the airways to assess more subtle lung function abnormalities or airway reactivity, and their role in developing a treatment (C2) 8. Choose and explain the bedside tool to assess pulmonary function in the spontaneously breathing and mechanically ventilated patient (C1,C2)	
Unit : 5		
Radiographic assessment	1. Identify normal chest structures the chest radiograph for proper placement of endotracheal tubes and vascular catheters (C3) 2. Identify the pathologies most commonly visualized on soft tissue images of the neck(C3) 3. Infer how atelectasis affects the individual lobes of each lung (C2) 4. Explain the radiographic appearance of cystic fibrosis(C2) 5. List the complications of chest trauma, and identify the placement of support devices (C1)	1 hour (L) 1 hour (T)
Unit : 6		
Paediatric flexible bronchoscopy	1. Identify common indications for bronchoscopy in infants children. (C3) 2. Compare between rigid and flexible bronchoscopy(C2) 3. Explain the preparation of equipment and patient for a flexible bronchoscopy procedure (C2) 4. Explain the monitoring of patient during a flexible bronchoscopy & list out the complications to during and after the procedure (C2) 5. Explain the disinfection of bronchoscopes after procedures(C2)	1 hour
Unit :7		
Invasive blood gas analysis and cardiovascular monitoring	1. Explain indications for obtaining blood gas samples(C2) 2. Identify common anatomical sampling sites used to obtain blood gases (C3) 3. Choose the potential patient and identify caregiver complications associated with blood gas sampling(C1) 4. Illustrate the progression of blood pressure waveforms seen during the proper placement of a pulmonary artery catheter (C2) 5. Explain invasive, semi-invasive, and noninvasive techniques for monitoring cardiac output (C2) 6. Explain the measurements that can be used to	2 hour

Content	Competencies	Number of hours
	determine the adequacy of cellular oxygenation (C2) 7. Identify variables that can shift the oxygen dissociation curve (C3)	
Unit: 8		
Non-invasive monitoring in neonatal and paediatric care	1. Explain the fundamental monitoring methods used to check vitals(C2) 2. Explain the principle and proper placement of a pulse oximeter probe (C2) 3. Explain the physiological phenomenon for a gradient between end-tidal and arterial CO2measurements(C2) 4. Interpret specific abnormalities associated with capnograms (C2) 5. Explain the importance of proper transcutaneous site selection and application(C2) 6. List two problems associated with transcutaneous monitoring(C1) 7. List the objective of indirect calorimetry and Identify its limitation(C1)	1 hour (L) 1 hour (T)
Unit:9		
Oxygen administration	1. Explain the causes, clinical signs , symptoms, and evidence of hypoxemia(C2) 2. Identify adverse physiological effects and equipment related complications associated with oxygen administration to neonates, infants, and children (C3) 3. Compare between variable-performance and fixed performance oxygen delivery systems(C2) 4. Explain the indications and contraindications for use of oxygen delivery devices in the neonatal and pediatric population (C2) 5. Explain the methods used to apply devices to deliver oxygen to neonates, infants, and children (C2)	1 hour (L) 1 hour (T)-
Unit:10		
Aerosol and administration of medication	1. Explain impact of differences in patient size and aerosol delivery (C2) 2. Explain the basic mechanisms of operation of nebulizer, pressurized metered-dose inhalers, and DPI (C2) 3. Select the best device for a pediatric patient for specific clinical applications(C1)	1 hour
Unit:11		
Airway clearance technique and hyperinflation therapy	1. Explain the indications and risks of airway clearance techniques(C2) 2. Apply the various techniques of airway clearance(C3)	1 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	3. Explain complications associated with airway clearance techniques (C2) 4. Explain the role of hyperinflation therapy and its relationship to proper airway clearance(C2)	
Unit:12		
Airway management	1. Identify four general indications for intubation (C3) 2. How to perform orotracheal and nasotracheal intubation (C1) 3. Select the correctly sized ET tube for patients of different ages (C1) 4. List the complications of intubation (C1) 5. Explain the criteria for extubation and the reasons for failed extubation and treatment strategies (C2) 6. List the indications for tracheotomy(C1) 7. Explain the major complications of tracheotomy(C2) 8. List the criteria for decannulation (C1) 9. Explain the setup and list the equipment needed for tracheostomy tube changes (C1,C2)	1 hour (L) 1 hour (T)
Unit :13		
Administration of gas mixture	1. Explain the effects of intravenous vasodilators and inhaled nitric oxide regarding ventilation-perfusion matching and shunt (C2) 2. Identify the potential side effects of inhaled nitric oxide(C3) 3. Explain the beneficial properties of helium when used medically (C2) 4. Explain how heliox affects nebulizers, flow meters, and mechanical ventilators(C2) 5. List the inhaled anesthetic agents that are commonly used to treat status asthmaticus and its physiological effects(C1)	1 hour
Unit: 14		
Pharmacology	1. Identify pharmacokinetic parameters that differ between pediatric and adult patients (C3) 2. Interpret the role of !2-adrenergic agonists in the treatment of asthma, chronic obstructive pulmonary disease (COPD), and exercise-induced bronchospasms(C2) 3. Identify potential adverse events observed with the use of inhaled short-acting !-adrenergic agonists (C3) 4. Explain administration issues after inhalation of corticosteroids (C2) 5. Explain the role of leukotriene modifiers (C2) 6. Explain the mechanism of action of the mucolytic agents(C2) 7. Explain the role of antiviral and immunomodulatory agents commonly used in	2 hour

Content	Competencies	Number of hours
	the treatment of pediatric viral infections(C2) 8. Explain the role of aerosolized antimicrobials used in the treatment of infectious respiratory diseases (C2)	
Unit 15:		
Paediatric airway disorder and parenchymal lung disease	1. Identify and name upper and lower airway disorders (C1,C3) 2. List the signs of severe or complete airway obstructions that require interventions (C1) 3. Explain the basic intervention and recommended therapy for each of the airway disorders and parenchymal lung diseases (C2) 4. Explain the different types of pneumonia and the etiology of pneumonia (C2)	1 hour (L) 1 hour (T)
Unit 16:		
Surgical disorder in childhood after respiratory care	1. Explain the anatomy and pathophysiology of the various congenital anomalies and surgical conditions in newborns and infants (C2) 2. Compare and contrast the potential sequelae of upper airway obstruction from upper airway anomalies(C2) 3. Explain the anatomy and pathophysiology of esophageal atresia with or without a tracheal fistula (C2) 4. Compare and contrast the signs and symptoms of esophageal atresia with or without a tracheal fistula(C2) 5. Explain the development, anatomy, and pathophysiology of CDH (C2) 6. Explain the steps related to emergency management of an infant in distress resulting from CDH(C2) 7. Explain the development, anatomy, and management of the problems associated with chest wall malformations, lung bud anomalies and pulmonary cystic malformations(C2)	1 hour
Unit 17:		
Asthma	1. Explain the pathophysiology of asthma(C2) 2. Identify the five components of asthma(C3) 3. How to improve the efficacy of the medications we use to treat asthma (C1)	1 hour (T)
Unit 18:		
Paediatric sleep disordered breathing, neurological and neuromuscular disorder	1. Explain the normal sleep architecture(C2) 2. Compare central and obstructive apnea (C2) 3. Explain the cause, pathophysiology and treatment of obstructive sleep apnea (C2) 4. List out the basic measurements made during a sleep study(C1) 5. Explain how the nervous system interacts with	1 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	the muscles of respiration during normal and pathological breathing (C2) 6. Identify the most common CNS and PNS abnormality that causes respiratory and neurological impairment(C3) 7. Explain the important features of the respiratory physical examination for children with neuromuscular weakness(C2) 8. Explain the respiratory aids to diagnose and support to manage respiratory system impairment (C2)	
Unit 19:		
Cystic fibrosis	1. Explain the pathophysiology and diagnosis of cystic fibrosis(C2) 2. Explain the genetic abnormality that results in cystic fibrosis(C2) 3. List the common pulmonary & nonpulmonary manifestations of cystic fibrosis(C1) 4. Explain the treatment protocol to manage cystic fibrosis pulmonary disease(C2)	1 hour (L) 1 hour (T)
Unit 20:		
Acute Respiratory distress syndrome	1. Define the criteria to diagnose ARDS (C1) 2. Explain the pathological stages,pathophysiology of ARDS (C2) 3. Explain the clinical approach to the management of patients with ARDS (C2) 4. Apply appropriate ventilator strategies in conventional mechanical ventilation of patients with ARDS(C3) 5. Outline adjunct therapies in the management in the of acute respiratory distress syndrome(C2)	1 hour (T)
Unit 21:		
Shock	1. Define *shock* and the key elements of shock pathophysiology (C1) 2. Identify the clinical presentation of selected shock case(C3) 3. Explain basic principles of management and treatment (C2)	1 hour (L) 1 hour (T)
Unit 22:		
Meningitis	1. Identify the necessary elements of diagnosing and treating pediatric patients with meningitis (C3)	1 hour (T)
Unit 23:		
Pediatric trauma	1. Explain the three general causes of brain damage (C2) 2. Explain the spectrum of thoracic injuries seen in pediatric practice (C2) 3. Explain the complications of blunt thoracic trauma in Children (C2) 4. Explain the spectrum of penetrating thoracic	1 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	injuries seen in children (C2) 5. List the epidemiology of thermal injury (C1) 6. List the basic management of thermal injury(C1) 7. Define *drowning* and other terms used to explain submersion injury (C1, C2) 8. List the strategies for respiratory management of drowning victims(C1) 9. List the strategies for prevention of unintentional Injuries(C1)	
Unit 24:		
Disorders of the pleura	1. Explain the normal function of the pleural space in healthy children (C2) 2. List the causes of pneumothorax in neonates and children(C1) 3. List the causes of pleural effusions and empyema in children(C1) 4. Outline the principles of managing abnormal air or fluid in the pleural space in children (C2)	1 hour

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**39**	**78**

Assessment Methods: Quiz, Assignments	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	-
Assignments/Presentations	-

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x				x
Quiz / Viva	x	x	x	x	x
Assignments	x		x	x	x
End semester Examination	x	x	x	X	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Brian K. Wlalsh Neonatal and Pediatric Respiratory care ISBN:978-145-575-3192 2. Egans fundamental of respiratory care.Robert L Wilkins ,12th edition. *ISBN* 9780323511124
Additional References	3. Nelsons textbook of paediatrics. Robert Kliegman.18th edition ISBN 9780323529501

Manipal College of Health Professions	
Name of the Department	Department of Respiratory therapy
Name of the Program	Bachelor of Science in Respiratory therapy
Course Title	**Pulmonary diseases**
Course Code	**RES2103**
Academic Year	Second Year
Semester	III
Number of Credits	2
Course Prerequisite	Students should have basic knowledge about the respiratory system and the common respiratory diseases.
Course Synopsis	This module helps the student understand 1. An insight to the diseases and disorder that occurs in the respiratory and cardiovascular system. 2. The pathophysiology, aetiology of the disease/disorder 3. To form the diagnosis and decide management of the disease/disorder

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Define the different disease and list out the etiology/causative agents (C1)
CO2	List the clinical manifestations/symptoms or each disease (C1)
CO3	Explain the gold standard diagnostic techniques for each disease process (C2)
CO4	Explain the pathophysiological process of the disease (C2)
CO5	Illustrate the different mechanical ventilation strategies (C2)
CO6	Illustrate the pharmacological and other management strategies (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	×							
CO2		×			x			
CO3			x	×				
CO4	×							
CO5							x	x
CO6						x	x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:Obstructive lung disease		
Chronic obstructive pulmonary disease	1. Explain the America thoracic society(ATS) guidelines for COPD(C2) 2. Explain the pathophysiology and causative agents(C2) 3. Explain the GOLD strategy for diagnosis, management and prevention of COPD(C2) 4. Demonstrate the clinical strategy in a case study.(C2)	2

Content	Competencies	Number of Hours
Asthma	1. Explain the GINA definition for asthma (C2) 2. List the etiology and risk factors.(C1) 3. Explain the pathophysiology and anatomic alterations in the lungs.(C2) 4. Explain the diagnosis and general management.(C2) 5. Demonstrate clinical strategies in a case study(C2)	2
Bronchiectasis	1. Define bronchiectasis(C1) 2. List the etiology and clinical symotoms(C1) 3. Explain the pathophysiology of bronchiectasis(C2) 4. List and explain the different diagnostic tests for bronchiectasis(C1,C2) 5. Explain the general management strategy(C2) 6. Demonstrate the clinical strategy in a case study(C2)	1
Unit 2: Infectious lung disease		
Pneumonia	1. Define pneumonia(C1) 2. List out the microorganisms causing pneumonia(C1) 3. Explain the pathophysiology and anatomic alterations in the lung.(C2) 4. Explain the different types of pneumonia and list the specific microorganisms involved(C2) 5. Explain the diagnostic techniques.(C2) 6. Demonstrate the pharmacological therapy for different microorgani(sm/pneumonia.(C2) 7. Demonstrate the clinical strategy in a case study.(C2)	2
Tuberculosis	1. Define tuberculosis(C1) 2. Explain the characteristics of the causative organism.(C2) 3. List the clinical features and risk factors of tuberculosis(C1) 4. Explain the pathophysiology and anatomic alteration in the lungs.(C2) 5. Explain the gold standard diagnosis and xray features in details.(C2) 6. Demonstrate the pharmacological therapy.(C2) 7. Demonstrate the clinical strategy in a case study.(C2)	1
Unit 3: Pulmonary vascular disease		
Pulmonary edema	1. Define pulmonary edema(C1) 2. List the etiological factors of pulmonary edema(C1) 3. Explain the pathophysiology and anatomic alterations in the lung(C2) 4. List the cardinal clinical manifestations.(C1)	1

Content	Competencies	Number of Hours
	5. Explain the diagnosis and general / pharmacological management.(C2) 6. Demonstrate the mechanical ventilatory strategies in case study.(C2)	
Pulmonary hypertension	1. Define pulmonary hypertension(C1) 2. List the causes of pulmonary hypertension(C1) 3. Explain the pathophysiology and anatomical alteration in lung(C2) 4. Explain the gold standard diagnosis for pulmonary hypertension(C2) 5. Explain the general management (C2) 6. Demonstrate clinical strategy in a case study.(C2)	1
Pulmonary embolism	1. Define pulmonary embolism(C1) 2. List the etiological causes and risk factors(C1) 3. Explain the pathophysiology and anatomic alterations in the lung.(C2) 4. List the cardiopulmonary manifestations(C1) 5. Explain the gold standard diagnosis for pulmonary embolism(C2) 6. Explain the general management(C2) 7. Demonstrate a clinical strategy in a case study.(C2)	1
Unit 4: Disease of chest wall and pleura		
Pneumothorax	1. Define pneumothorax(C1) 2. Explain the types of pneumothorax based on the causes(C2) 3. Explain the pathophysiology and anatomic alterations in the lung and thorax(C2) 4. Explain the diagnostic tests for pneumothorax(C2) 5. Explain the management strategy in an emergent situation(C2) 6. Explain the ventilatory strategy in hospital setting(C2) 7. Demonstrate clinical strategy in case study(C2)	1
Flail chest	1. Define flail chest(C1) 2. Explain the pathophysiology(C2) 3. List the cardiopulmonary manifestations(C1) 4. Explain the diagnostic techniques(C2) 5. Explain the general management and ventilatory strategies of flail chest(C2)	1
Pleural effusion and empyema	1. Define pleural effusion and empyema(C1) 2. Explain the pathophysiology and anatomic alteration in the lung(C2) 3. List the cardiopulmonary manifestation (C1) 4. Explain the diagnostic techniques(C2) 5. Explain the general management(C2) 6. Demonstrate clinical strategy in case study(C2)	1

Content	Competencies	Number of Hours
Unit 6: Diffuse alveolar disorder		
Acute respiratory distress syndrome (ARDS)	1. Define the berlin's definition for ARDS(C1) 2. List the direct and indirect causes of ARDS(C1) 3. Explain the pathophysiology and anatomical alterations in the lungs(C2) 4. Explain the gold standard diagnosis of ARDS(C2) 5. Explain the pharmacological treatment for ARDS(C2) 6. Explain the ARDSnet protocol for mechanical ventilation(C2) 7. Demonstrate a clinical strategy in a case study(C2)	2
Unit 7: Neuromuscular disorder		
Gullian barre syndrome (GBS)	1. Define Gullian barre syndrome(C1) 2. List the causes of GBS(C1) 3. Explain the pathophysiology and the effects of GBS on pulmonary system(C2) 4. List the clinical symptoms(C1) 5. Explain the gold standard diagnostic methods(C2) 6. Explain the pharmacological and non-pharmacological management for GBS.(C2)	1
Myasthenia gravis (MG)	1. Define myasthenia gravis(C1) 2. List the causes of MG(C1) 3. Explain the pathophysiology and the effects of MG on pulmonary system(C2) 4. List the clinical symptoms(C1) 5. Explain the gold standard diagnostic methods(C2) 6. Explain the pharmacological and non-pharmacological management for MG.(C2)	1
Unit 8: Sleep related disorder		
Sleep apnea	1. Define sleep apnea (C1) 2. List the causes for different types of sleep apnea(C1) 3. Explain the pathophysiology of a. Obstructive sleep apnea b. Central sleep apnea (C2) 4. List the cardiopulmonary manifestation and risk factors for sleep apnea (C1) 5. Explain the gold standard technique to diagnose sleep apnea(C2) 6. Explain in detail the pharmacological and non-pharmacological treatment for different types of sleep apnea(C2)	2

Content	Competencies	Number of Hours
Unit 9: Therapist driven protocol		
Respiratory failure and mechanical ventilation	1. Define respiratory failure(C1) 2. Explain the two major classification of respiratory failure(C2) 3. Explain the respiratory disorders associated with the different types of respiratory failure(C2) 4. Explain the pathophysiologic process of the two types of respiratory failure(C2) 5. Explain the major components of mechanical ventilation protocol(C2)	2
Unit 10: Restrictive lung disease		
Interstitial lung disease (ILD)	1. Define interstitial lung disease(C1) 2. List the causes of interstitial lung disease(C1) 3. Explain the pathophysiology and anatomic alteration in the lungs(C2) 4. List the cardiopulmonary manifestation(C1) 5. Explain the general management of chronic interstitial lung disease.(C2) 6. Explain the clinical strategies and rationales of the SOAPs presented in the case study.(C2)	1
Unit 11: Other disorders		
Drowning	1. Define drowning(C1) 2. Explain the classification of drowning(C2) 3. List the causes and risk factors of drowning(C1) 4. Explain the pathophysiology and effects to other organ system(C2) 5. Explain the stages of clinical features associated with drowning(C2) 6. Explain the general management for drowning and explain the chain of survival(C2)	1
Smoke inhalational injury and carbon monoxide poisoning	1. Define smoke inhalational injury and CO poisoning(C1) 2. List the causes and risk factors(C1) 3. Explain the pathophysiology and anatomic alterations in the respiratory system(C2) 4. List the cardinal features(C1) 5. Explain the gold standard diagnosis for smoke inhalational injury and CO poisoning(C2) 6. Explain the general management and mechanical ventilatory strategy for smoke inhalational injury and CO poisoning(C2) 7. Explain the special management strategies for CO poisoning(C2)	1
Atelectasis	1. Define atelectasis(C1) 2. List the causes of atelectasis(C1) 3. Explain the pathophysiology (C2) 4. Explain the diagnostic techniques(C2)	1

Content	Competencies	Number of Hours
	5. Explain the management for atelectasis(C2) 6. Demonstrate a clinical strategy in a case study(C2)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**26**	**52**

Assessment Methods:	
Formative:	Summative:
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	-
Assignments/Presentations	Record Book

Mapping of Assessment with COs:

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x	x	x			
Quiz		x	x	x		
Assignments	x		x	x	x	x
End Semester Exam	x	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	Egan's Fundamentals Of Respiratory Care 11th Edition, *ISBN* 9780323511124 Terry Das Jardins, Clinical Manifestations And Assessment Of Respiratory Disease, 8th Edition, ISBN-10: 0323553699 Andrew D Bersten, Ohs Intensive Care Manual, 8th Edition, ISBN**:** 9780702072215
Additional References	Jameson, Faugi, Harrisons Principle Of Internal Medicine, 20th Edition ISBN-13: 978-1259834806

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical - I**
Course Code	**RES2131**
Academic Year	Second Year
Semester	III
Number of Credits	4
Course Prerequisite	The student should have a basic theoretical knowledge on these topic and basic competency skills.
Course Synopsis	At the end of this course student should be able to: • Provide respiratory care to all patients in all intensive care units. • Apply the knowledge and skills necessary to provide appropriate interactions with staff, patients, and families of all ages.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Perform infection control practices (P5)
CO2	Perform the initial assessment in terms of obtaining vitals (P4)
CO3	Recognize and perform the respiratory care & related diagnostic procedures as per the patient requirement(P5)
CO4	Perform basic life support during cardiopulmonary arrest scenarios(P5)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		
CO2	x			x				
CO3			x				x	
CO4					x			x

Course Content and Outcomes:

Content	**Competencies**	**Practical Hours**
Unit 1:		
Handwashing	1. Perform hand hygiene technique (P3)	1
Unit 2:		
Universal Precautions	1. Perform appropriate use of personal protective equipment (P4) 2. Perform proper disposal of PPE after use (P4)	1
Unit 3:		
Obtaining Vitals	1. Identify equipment routinely used to assess vital signs(P3) 2. Perform appropriate use of devices in terms of placement of probe, calibration of device and identifying any malfunction to obtain authentic	2

Content	Competencies	Practical Hours
	information of patient vitals(P4) 3. Identify the abnormalities in vital signs (P3) 4. Perform proper documentation of patient vitals (P4)	
Unit 4:		
Oxygen therapy administration	1. Perform verification of order(P3) 2. Explain the purpose of initiating oxygen therapy to patient(P2) 3. Organise and assemble the necessary equipment's for initiating oxygen therapy(P3) 4. Examine the proper functioning of the set up(P3) 5. Apply the device to patient face assuring proper fit and comfort(P4) 6. Perform proper documentation of the patients condition during the procedure(P4)	2
Unit 5:		
Incentive Spirometry	1. Perform verification of order(P3) 2. Explain the purpose and beneficial effects of the device(P2) 3. Perform proper patient positioning(P3) 4. Organise and assemble the necessary equipment's for initiating oxygen therapy(P3) 5. Motivate and assist the patient to perform procedure in an effective ways(P4) 6. Perform proper documentation of the patients condition during the procedure(P4)	1
Unit 6:		
Basic Life Support (BLS)	1. Identify when to initiate CPR(P3) 2. Perform cardiopulmonary resuscitation (CPR) on adults, children, and infants(P5) 3. Perform defibrillation with automated external defibrillators(P5) 4. Evaluate quality and effectiveness of CPR(P5)	2
Unit 7:		
Humidification therapy	1. Identify the requirement of active and passive humidification therapy for each patients(P3) 2. Apply active humidification therapy under aseptic technique to the patient(P4) 3. Identify the optimum humidity, temperature, and proper connections for invasive ventilated patients(P5) 4. Perform timely monitoring regarding adequate water level, temperature, pressure and troubleshooting(P5)	1
Unit 8:		
Aerosol Therapy	3. Choose appropriate aerosol generating devices accordingly to the patient's clinical condition. (P3) 4. Explain the procedure and instruct the patient (P1) 5. Choose appropriate interfaces to deliver the aerosol therapy efficiently in noninvasively	1

Content	Competencies	Practical Hours
	ventilated patients(P3) 6. Perform aerosol therapy following aseptic practices(P5) 7. Decide the drug and prepare medication as per the dosage required.(P5)	
Unit 9:		
Airway clearance techniques	1. Perform airway clearance when indicated for a patient (P4) 2. Explain the procedure and indication for the procedure before doing (P1) 3. Identify the situation in which airway clearance is contra indicated(P3) 4. Choose the appropriate suction catheters(P3)	1

Learning Strategies	Contact Hours	Student Learning Time (SLT)
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic	144	
Practical	12	36
Revision		
Assessment		
Total	**156**	**36**

Assessment Methods:	
Formative:	Summative:
Viva Competency manual	End Semester Exam (Practical)

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester / Sessional Examination 1	-	-	-	-
End Semester Exam	x	x	x	x
Feedback Process:	End-Semester Feedback			

SEMESTER - IV

COURSE CODE	:	COURSE TITLE
GPY2201	:	General Psychology
BST3201	:	Biostatistics and Research Methodology
RES2201	:	Community medicine
RES2202	:	Respiratory Care Pharmacology
RES2231	:	Clinical - II
RES****		Program Elective - I

Manipal College of Health Professions	
Name of the Department	Department of Respiratory therapy
Name of the Program	Bachelor of Science in Respiratory therapy
Course Title	**General Psychology**
Course Code	**GPY2201**
Academic Year	Second Year
Semester	IV
Number of Credits	2
Course Prerequisite	Nil
Course Synopsis	1. Orients and familiarises students towards the basic psychological processes 2. Enables the students to understand how psychological principles are applied in day to day life.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the basic concepts in Psychology. (C2)
CO2	Explain how the processes of perception , learning, memory , thinking and intelligence contributes to the uniqueness of the individual (C2)
CO3	Outline the role of motivation , emotion and personality in shaping human behaviour (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2						x	x	
CO3						x	x	

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Introduction to Psychology	1. Define Psychology(C1) 2. Outline the evolution of Psychology as a scientific discipline (C2) 3. Summarise the modern schools of Psychology 4. Enumerate the different branches of Psychology(C1) 5. What is Introspection? List the merits and demerits of introspection (C1) 6. Explain the importance of Experimental method in the field of Psychology(C2) 7. Explain the observation method in Psychology (C2)	3
Unit 2:		
Perception	1. Define Perception (C1) 2. Describe the various principles of Perceptual groupings (C2) 3. Illustrate the Gestalt laws of perception (C2) 4. Define Perceptual constancy and explain its types(C2)	3

Content	Competencies	Number of Hours
	5. Explain Monocular and Binocular cues in Perception (C2) 7. Explain types of motion perception (C2)	
Unit 3:		
Learning	1. Define Learning (C1) 2. Explain Pavlov's Classical Conditioning(C2) 3. Summarize the various processes of Classical Conditioning with examples (C2) 4. Explain the applications of Classical Conditioning(C2) 5. What is Operant Conditioning (C1) 6. Compare the types of reinforcement and Punishment(C2) 7. Explain with the examples the schedules of Reinforcement (C2) 8. Explain the applications of Operant Conditioning(C2) 8. Explain observation learning with its classic experiment (C2) 9. Illustrate the processes in observation learning (C2)	3
Unit 4:		
Memory	1. Define Memory (C1) 2. List the processes that underlie memory (C1) 3. Explain the characteristics of different types of memory(C2) (sensory, STM, LTM) 4. Summarise the different theories of forgetting (C2) (Decay, motivated forgetting, interference, cue dependant displacement) 5. List the various strategies to improve memory (C1)	3
Unit-5:		
Thinking & Problem solving	1. Define thinking (C1) 2. How thoughts are represented (C1) 3. Define concepts(C1) 4. Compare the different types of concept (C2) 5. Enumerate the steps in creative thinking (C1) 6. List the steps involved in problem solving (C1) 7. What are the different strategies used to solve problems (C1) (Trial & error, Heuristics, Algorithm)	2
Unit-6:		
Intelligence	1. Define Intelligence (C1) 2. Summarise the various theories of Intelligence (C2) (Two factor, Crystallised and Fluid, Multiple intelligence) 3. List the different types of Intelligence tests (C1) 4. Define Emotional Intelligence (C1) 5. What are the different components of emotional intelligence? (C1)	3
Unit-7:		
Motivation & Conflict	1. Define Motivation (C1) 2. Summarize the biological theories of Motivation (C2) (Drive reduction theory, Optimal arousal theory,	3

Content	Competencies	Number of Hours
	Instinct theory) 3. Explain the Psychological theories of Motivation (C2) (Maslow's hierarchy theory) 4. Define Conflict (C1) 5. Explain the types of Conflict with examples (C2) (Approach- Approach conflict, Avoidance-Avoidance conflict, Approach- Avoidance conflict and Double Approach- Avoidance conflict) 6. Summarise the different ways to handle conflict (C2)(Task and defense oriented)	
Unit-8:		
Emotion	1. Define Emotion (C1) 2. List the characteristics of Emotion (C1) 3. Explain the various theories of Emotion (C2) (James-Lange, Cannon- Bard, Schatcher- Singer)	2
Unit-9:		
Personality	1. Define Personality(C1) 2. Explain the Psychodynamic theory of Personality (C2) 3. Explain the trait approach towards Personality (C2) 4. Summarize Rogers' humanistic approach in understanding Personality (C2) 5. Enumerate the various assessment methods in studying Personality (C1)	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	78
Seminar	-	
Small group discussion (SGD)	-	
Self-directed learning (SDL)	-	
Problem Based Learning (PBL)	-	
Case Based Learning (CBL)	-	
Clinic	-	
Practical	-	
Revision	-	
Assessment	-	
Total	**26**	**78**
Assessment Methods:		
Formative:	**Summative:**	
Nil	Mid Semester/Sessional Exam (Theory)	
Nil	End Semester exam (Theory)	

Mapping of Assessment with COs:			
Nature of Assessment	**CO1**	**CO2**	**CO3**
Mid Semester/Sessional examination	x	x	
End semester exam	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Baron, R. A., Byrne, D., & Mankowitz, B. H. (1977). *Psychology: Understanding behaviour.* Philadelphia: W.B. Saunders Co. 2. Feldman, R. S. (1993). *Understanding Psychology*. New York: McGraw-Hill.
Additional References	1. Myers, D. G. (2005). *Exploring psychology*. New York, NY: Worth Publishers.

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Biostatistics and Research Methodology**
Course Code	**BST3201**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	Nil
Course Synopsis	1. To provide necessary foundation on • Introductory level biostatistics • Demography, vital statistics and epidemiology • Survey sampling methods • Fertility, morbidity, and mortality indices 2. To introduce the steps involved in research process

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain characteristics of statistical data, types of variables, scales of measurement, presentation of data, normal distribution. (C2)
CO2	Apply measures of location and variation for statistical data (C3)
CO3	Outline the sources of demographic data and vital statistics, merits and demerits of probability and non-probability sampling techniques. (C2)
CO4	Explain the indices of fertility, morbidity and mortality, Epidemiology, observational study designs (C2)
CO5	Explain the concept of correlation and regression. (C2)
CO6	Summarize the steps involved in a research process (C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2	x							
CO3	x							
CO4		x						
CO5	x							
CO6	x							

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Introduction to Biostatistics	• Define biostatistics (C1) • Describe the characteristics of statistical data (C2) • Explain the role of statistics in health sciences (C2)	2
Variables	• Distinguish between qualitative & quantitative with appropriate examples (C2)	4

Content	Competencies	Number of Hours
	• Distinguish between continuous & discrete variables with appropriate examples (C2) • Distinguish between nominal & ordinal variables with appropriate examples (C2)	
Scales of Measurement	• Describe nominal scale of measurement of variables with appropriate examples (C2) • Describe ordinal scale of measurement of variables with appropriate examples (C2) • Describe interval scale of measurement of variables with appropriate examples (C2) • Describe ratio scale of measurement of variables with appropriate examples (C2)	4
Unit 2:		
Tabular presentation of data	• Describe the three types of class intervals – inclusive, exclusive and open ended (C2) • Explain the concepts of relative and cumulative frequencies (C2) • Construct the frequency table (C3)	2
Graphical presentation of data	• Explain the concepts of Histogram, Frequency Polygon, Frequency Curve (C2) • Construct Histogram, Frequency Polygon, Frequency Curve for statistical data (C3)	2
Diagrammatic presentation of data	• Explain the concepts of Bar diagram and Pie diagram (C2) • Construct Bar diagram and Pie diagram for statistical data (C3)	2
Unit 3:		
Measures of Location	• Explain the concepts of Mean, Median, Mode (C2) • Explain the concepts of Quartiles and Percentiles (C2)	2
Unit 4:		
Measures of Variation	Describe the concepts of Range, Inter-quartile range, Variance, Standard deviation and Coefficient of variation (C2)	2
Unit 5:		
Sampling	• Explain sampling and non-sampling error (C2) • Define and distinguish probability and non-probability sampling methods (C1) • Explain each sampling technique by stating their merits and demerits (C2)	4
Unit 6:		
Normal Distribution	• Explain the characteristics of normal distribution (C2) • Compute the area under the normal distribution curve (C3)	2
Skewness and Kurtosis	• Explain the concept of skewness and describe three types of skewness (C2) • Explain the concept of kurtosis and describe three	2

Content	Competencies	Number of Hours
	types of kurtosis (C2)	
Unit 7:		
Correlation	• Define correlation (C2) • Explain positive and negative correlation with appropriate examples (C2) • Explain the Pearson's correlation coefficient and outline its properties (C2) • Explain the Spearman's correlation coefficient and outline its properties (C2) • Illustrate using scatter plot the different types of correlation (C3)	2
Regression	• Distinguish between dependent and independent variables. (C2) • Explain the simple linear regression model along with the assumptions involved. (C2) • Identify the slope and intercept coefficient from the model. (C2) • Predict the dependent variable from the model for a given set of independent variables. (C3)	2
Unit 8:		
Demography and Vital statistics	• Define Demography and Vital statistics (C1) • What are the sources of demographic data and vital statistics (C1) • Define and distinguish rate, ratio and proportion (C1)	2
Morbidity, mortality and fertility rates	• Explain prevalence and incidence (C2) • Explain each measure of morbidity, mortality and fertility rates by stating the formula (C2)	4
Unit 9:		
Research	• Explain sampling and non-sampling error (C2) • Define and distinguish probability and non-probability sampling methods (C1) • Explain each sampling technique by stating their merits and demerits (C2)	3
Unit 10:		
Epidemiology	• Define Epidemiology (C1) • Explain the observational study designs (case report, case series, cross-sectional, ecological) (C2)	4

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	45	135
Seminar	-	-
Small group discussion (SGD)	-	-
Self-directed learning (SDL)	-	-
Problem Based Learning (PBL)	-	-

Case Based Learning (CBL)	-	-
Clinic	-	-
Practical	-	-
Revision	-	-
Assessment	-	-
Total	**45**	**135**

Assessment Methods:

Formative:	**Summative:**
Unit Test	Mid Semester Exam (Theory)
	End Semester Exam (Theory)

Mapping of Assessment with COs:

Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester Examination	x	x				
Quiz / Viva						
Clinical/Practical Log Book/ Record Book						
Any others: WPBA						
End Semester Exam	x	x	x	x	x	X

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Lwanga SK, Tye CY, Ayeni O. Teaching health statistics: lesson and seminar outlines. World Health Organization, Marketing and Dissemination, 1211 Geneva 27, Switzerland; 1999. 2. Health research methodology: a guide for training in research methods. World Health Organization; 2001. 3. Bonita R, Beaglehole R, Kjellström T. Basic epidemiology. World Health Organization; 2006. 4. Campbell MJ, Swinscow TD. Statistics at square one. John Wiley & Sons; 2011.
Additional References	1. Degu G, Tessema F. Biostatistics [Internet]. Gondor: University of Gondar; January 2005. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_biostat_hss_final.pdf 2. Kebede Y. Epidemiology [Internet]. Gondor: University of Gondar; 2004. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_stud ents/Epidemiology.pdf 3. Degu G, Yigzaw T. Research Methodology [Internet]. Gondor: University of Gondar; 2006. Available from: http://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_research_method_final.pdf 4. Morris JN. Uses of epidemiology. Edinburgh, UK: Churchill Livingstone; 1975. 5. Campbell MJ, Machin D, Walters SJ. Medical statistics: a textbook for the health sciences. John Wiley & Sons; 2010. 6. Rao PS, Richard J. An Introduction to Biostatistics: A manual for students in health sciences. Prentice/Hall of India; 1996. **7.** 11. Mahajan BK, Khanal AB. Methods in biostatistics: for medical students and research workers. Jaypee Brothers Medical Publishers; 2010.

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Community Medicine**
Course Code	**RES2201**
Academic Year	Second Year
Semester	IV
Number of Credits	2
Course Prerequisite	The student should have a basic knowledge about the communicable diseases affecting the respiratory system.
Course Synopsis	The students will learn about 1. The fundamentals of community medicine from the perspective of a respiratory therapy student. 2. The application of social medicine in health care practice.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the aspects of health and wellbeing.(C1)
CO2	Explain the importance of respiratory care education in community medicine. (C2)
CO3	Explain the dynamics of disease transmission in the community.(C1)
CO4	Explain the epidemiology, risk factors, management and prevention of various communicable diseases.(C2)
CO5	Explain and explain the proper biomedical waste disposal and environmental hazard prevention.(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x			x				
CO2		x						x
CO3	x					x		
CO4							x	x
CO5			x		x			

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
		Lecture
Unit 1:		
Definition of community medicine and natural history of diseases epidemiological concept of interaction agents, host and environmental agent factors.	1. Define community medicine (C1) 2. Explain the natural history of disease in terms of period of pre pathogenesis and pathogenesis (C2) 3. Explain the germ theory of causation of disease(C2) 4. Explain the factors that constitutes epidemiological factors(C2)	2

Content	Competencies	Number of Hours
		Lecture
Unit 2:		
Dynamics of disease transmission- sources and reservoir – modes of transmission susceptible host	1. Define the terms infection, infestation, contamination and host (C1) 2. Explain infectious disease, contagious disease, nosocomial infection, zoonotic disease, opportunistic infection and iatrogenic disease(C2) 3. List the sources and reservoir of a communicable disease (C1) 4. List the different types of reservoir C1) 5. List and explain the modes of transmission in an infectious disease (direct and indirect transmission) (C2) 6. List the four stages of successful parasitism(C1) 7. Explain incubation period, latent period, generation time, communicable period, serial interval (C2)	2
Unit 3:		
Disease prevention on levels of prevention and modes of intervention	1. List the preventive measures to control a communicable disease (C1) 2. List and explain the seven general measures to control human reservoir (C2) 3. Outline the measures to interrupt the transmission of communicable disease (C2)	2
Unit 4:		
Vaccine preventable disease /importance of immunization/immunization schedule	1. List the specific defences and classify active and passive immunity (C2) 2. Explain the immunizing agents: vaccines, immunoglobulin, antisera(C2) 3. List the types of vaccines, immunizing agents and antisera currently in use (C1) 4. List the vaccines for vaccine preventable disease (C1) 5. List the national immunization schedule and WHO EPI schedule of disease (C1)	2
Unit 5:		
Hospital acquired infection and its prevention and control	1. Explain hospital acquired infection (C2) 2. Define nosocomial infection and explain the types of infection disease which can be spread via nosocomial infection (C1, C2) 3. List the sources, route of spread and recipients of nosocomial infection(C1) 4. Outline the preventive measures (C2) 5. Outline the standard precautions(C2)	2
Unit 6:		
Disposal of hospital wastes	1. Definition of biomedical waste (C1) 2. Classify health care waste(C2) 3. List and explain the treatment and disposal technologies for health care waste(C1,C2)	2

Content	Competencies	Number of Hours
		Lecture
	4. Explain biomedical waste management and list the categories of biomedical waste in India (C2) 5. List the colour coding and type of container for disposal of bio-medical waste (C1)	
Unit 7:		
Tuberculosis and RNTCP in brief ARI and influenza prevention	1. What is tuberculosis and name the causative organism (C1) 2. Classification of diagnosed TB cases (C2) 3. List the factors that affects the transmission of TB(C1) 4. Explain the curative and preventive measures to control TB (C2) 5. List the first line and second line drugs for TB(C1) 6. Outline the long course regimen and short course chemotherapy(C2) 7. Outline the role of DOTS and DOTS plus in treatment of TB (C2) 8. Explain the RNTCP regimen for MDR-TB and XDR-TB(C2)	2
Unit 8:		
Epidemiology of respiratory communicable diseases.	1. Explain the definition, risk factors, management and prevention for the following: (C2) • Smallpox • Chickenpox • Measles • Rubella • Mumps • Influenza • Diphtheria • Whooping cough • Acute respiratory infection • Meningococcal meningitis • SARS • Tuberculosis	3
Unit 9:		
Congenital heart diseases(CHD) and obesity	1. Explain the epidemiology of CHD.(C2) 2. Explain the risk factors and prevention of CHD (C2) 3. Explain prevalence and epidemiology of obesity. (C2) 4. Explain the classification and assessment of obesity. (C2) 5. Explain the prevention strategies of obesity.(C2)	2
Unit 10:		
Diabetes and hypertension	1. Classification of diabetes and hypertension. (C2) 2. Explain three levels of prevention of diabetes.(C2)	2

Content	Competencies	Number of Hours
		Lecture
	3. Explain risk factors of hypertension.(C2) 4. Explain the various prevention strategies for hypertension.(C2)	
Unit 11:		
	1. Explain the complications of alcoholism and tobacco use. (C2) 2. Explain the various alternative nicotine products and pharmacological therapy for tobacco use. (C2) 3. Explain the prevention and counselling for alcoholism and tobacco use. (C2)	2
Unit 12:		
Environmental sanitation and prevention of environmental pollution	1. Explain various environmental sources for community use. (C2) 2. Explain various prevention strategies for environmental pollution.(C2) 3. Explain various methods of environmental sanitation .(C2)	2
Unit 13:		
Nutritional problems and balanced diet education in public health	1. List and explain the nutritional problems in public health.(C1) 2. List the diseases associated with nutritional deficiency.(C1) **3.** Explain the various balanced diet plans.(C2)	1

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**26**	**52**
Assessment Methods:		
Formative:	**Summative:**	
Unit Test	Mid Semester/Sessional Exam	
Quiz	End Semester Exam	

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Quiz / Viva				x	
Assignments/Presentations		x		x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. K Park, *Park Textbook of Preventive and Social Medicine* 23rd edition; *ISBN*-10: 9382219129
Additional References	2. AM Kadri, IAPSM's textbook of community medicine, AM Kadri, IAPSM's textbook of community medicine, *ISBN*-13: 978-9352709946

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Respiratory Care Pharmacology**
Course Code	**RES2202**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	Students should have a basic knowledge on importance of drugs in respiratory disorders.
Course Synopsis	1. The course is designed to provide student with a solid grounding in the basic concepts and principles that will serve as the foundation for understanding the pharmacology of specific drugs. 2. To provide the student with a comprehensive knowledge on the drugs used to treat the respiratory system disorders. 3. To understand the pharmacology and clinical use of major classes of clinically important drugs.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain how the basic scientific concepts and principles can influence the route of drug administration, drug action, calculation of drug doses, and the appropriate choice of drug. (C2).
CO2	List the major drugs and drug classes currently used in treatment of respiratory system disorders and in critical care. (C1).
CO3	Explain the specific pharmacology of the major drugs and drug classes in terms of indications, contraindications, mechanism of action and adverse effects (C2).
CO4	Apply the knowledge of specific pharmacology of the major drug classes to select the most appropriate medication (C3)
CO5	Clinically identify the adverse effects of certain pharmacotherapy. (C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2	x					x		
CO3		x	x					
CO4					x			x
CO5		x		x				

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Basic Concepts and Principles in Pharmacology		
Introduction to Respiratory Care	1. Define the terms pharmacology, drugs, and orphan drugs(C1)	1

Content	Competencies	Number of Hours
Pharmacology	2. Explain how drugs are named (C2) 3. List the various sources used to manufacture drugs (C1) 4. Explain the process for drug approval (C2) 5. Compare between prescription drugs and over-the-counter drugs (C2) 6. Explain the therapeutic purpose of each of the major aerosolized drug groups (C2)	
Principles of Drug Action	1. Define the drug administration phase, pharmacokinetic phase, and pharmacodynamics phase (C1) 2. Explain the various routes of administration available (C2) 3. Explain the key factors in the pharmacokinetic phase (C2) 4. Explain the concept of first-pass effect(C2) 5. Compare the pharmacokinetic phases in systemic and inhaled drugs (C2) 6. Explain the L/T ratio (C2) 7. Explain the role of drug receptors (C2) 8. Explain the importance of pharmaco-genetics (C2)	1
Administration of Aerosolized Agents	1. Define terms that pertain to administration of aerosol agents (C1) 2. Compare between various types of aerosol delivery devices and select an appropriate nebulizer on the basis of particle size distributions (C2) 3. Explain aerosol particle size and deposition in the lungs (C2) 4. Summarize the clinical applications of aerosol devices (C2) 5. Select the appropriate aerosol therapy devices (C1) 6. List and explain the most important factors affecting neonatal and pediatric aerosol drug delivery (C1,C2) 7. Explain the most relevant factors to select the appropriate aerosol delivery device according to age group (C2) 8. Explain the process of aerosol administration in intubated neonatal and pediatric patients. (C2)	1
Calculating Drug Doses	1. Define key terms pertaining to calculating drug dose (C1) 2. Make use of the metric system (C3) 3. Identify drug doses, using proportions (C3) 4. Identify drug doses, using percentage-strength solutions (C3)	I hour (T)
Central and Peripheral Nervous System	1. Define key terms pertaining to the central and peripheral nervous systems (C1)	2

Content	Competencies	Number of Hours
	2. Explain about the differences between central, peripheral, and autonomic nervous systems (C2) 3. Explain the use of neurotransmitters and the differences between the parasympathetic and sympathetic branches of the nervous system (C2) 4. Compare the effects of cholinergic and anticholinergic agents, and adrenergic and antiadrenergic agents on the nervous system (C2) 5. List and explain the various receptors in the airways (C1,C2) 6. Explain the differences between nonadrenergic, noncholinergic inhibitory, and excitatory nerves (C2)	
Unit 2: Drugs Used to Treat the Respiratory System		
Adrenergic (Sympathomimetic) Bronchodilators	1. Define the terms sympathomimetic and adrenergic (C1) 2. List all currently available β-adrenergic agents used in respiratory therapy (C1) 3. Explain the differences between the specific adrenergic agents and formulations (C2) 4. Explain the mode of action for each specific adrenergic agent and formulation (C2) 5. Select the route of administration available for β-agonists (C1) 6. List adverse effects of β-agonists (C1)	2
Anticholinergic (Parasympatholytic) Bronchodilators	1. Define terms that pertain to anticholinergic bronchodilators (C1) 2. Compare and contrast between parasympathomimetic and parasympatholytic drugs; cholinergic and anticholinergic drugs; and muscarinic and antimuscarinic drugs (C2) 3. List all available anticholinergic agents used in respiratory therapy (C1) 4. Explain the mode of action for anticholinergic agents and list the indications and adverse effects of anticholinergic agents (C2) 5. Identify the route of administration available for anticholinergic agents and explain the clinical application for anticholinergic agents (C3)	2
Xanthines	1. Define xanthine (C1) 2. List all available xanthines used in respiratory therapy(C1) 3. Explain the clinical indications of xanthines (C2) 4. List the uses of xanthines (C1) 5. Outline the proposed theories of activity for xanthines (C2) 6. List adverse effects and toxicity of xanthines	2

Content	Competencies	Number of Hours
	(C1)	
Mucus-Controlling Drug Therapy	1. Define terms that pertain to mucus-controlling drug therapy (C1) 2. Explain the physiology and mechanisms of mucus secretion and clearance (C2) 3. List the types of mucoactive medications and their presumed modes of action (C1) 4. List and explain the medications approved for the therapy of mucus clearance disorders and their approved indications (C1,C2) 5. List the contraindications to the use of mucoactive medications (C1) 6. Explain the interaction between airway clearance devices or physical therapy and mucoactive medications (C2)	2 hour (T)
Surfactant Agents	1. Define key terms that pertain to surfactant agents (C1) 2. List all available exogenous surfactant agents used in respiratory therapy (C1) 3. Explain the route of administration and mode of action for exogenous surfactant agents (C2) 4. Identify hazards and complications of exogenous surfactant therapy (C3)	2 hour (T)
Corticosteroids in Respiratory Care	1. List all available inhaled corticosteroids and their indications (C1) 2. Explain the differences between specific corticosteroid formulations (C2) 3. Explain the mode of action and list the route of administration available for corticosteroids (C2) 4. Explain the effect corticosteroids have on the white blood cell count and on β -receptors (C2) 5. Compare the systemic and local side effects of corticosteroids (C2) 6. Outline the use of corticosteroids in the treatment of asthma and chronic obstructive pulmonary disease (C2)	2
Nonsteroidal Antiasthma Agents	1. List the indications for use of nonsteroidal antiasthma agents (C1) 2. List the available nonsteroidal antiasthma agents used in respiratory therapy (C1) 3. Explain the differences between the specific nonsteroidal antiasthma agents. (C2) 4. List the routes of administration available for various nonsteroidal antiasthma agents (C1) 5. Explain the mode of action for various nonsteroidal antiasthma agents (C2) 6. Explain the use of nonsteroidal antiasthma agents in the treatment of asthma (C2)	1 Hour (L) 1 hour (T)

Content	Competencies	Number of Hours
Aerosolized Antiinfective Agents	1. Define terms that pertain to aerosolized antiinfective agents (C1) 2. List the available inhaled antiinfective agents used in respiratory therapy and their indications (C1) 3. Compare between specific antiinfective agent formulations (C2) 4. Explain the route of administration available for the various inhaled antiinfective agents (C2) 5. Explain the mode of action and list the side effects for the various antiinfective agents (C2) 6. Explain the use of each antiinfective agent in the treatment of lung disease (C2)	2 hour (T)
Antimicrobial Agents	1. Define terms that pertain to antimicrobial agents (C1) 2. Explain the process involved in bacterial susceptibility testing (C2) 3. Explain possible outcomes of antimicrobial combinations (C2) 4. List the various classes of the penicillin's and cephalosporin's (C1) 5. Identify similarities between members of (i) the macrolides (ii) the quinolones (iii) the echinocandins (C3) 6. List four mechanisms of action of antibacterial (C1) 7. Outline the commonly used azole antifungals and how they differ in spectrum of activity (C2) 8. Explain the mechanism of action of the antiretroviral (C2)	2
Cold and Cough Agents	1. Define key terms that pertain to cold and cough agents (C1) 2. Explain the differences between the common cold and the flu (C2) 3. Compare between the specific types of cold and cough agents (C2) 4. Explain the mode of action for each specific cold and cough agent (C2)	2 hour (T)
Selected Agents of Pulmonary Value	1. Define key terms and definitions pertaining to selected agents of pulmonary value (C1) 2. List the α1-proteinase inhibitors that are available and the indications for α1-proteinase inhibitor therapy (C1) 3. Identify α1-proteinase inhibitor deficiency in a patient (C3) 4. List three types of formulations for nicotine replacement (C1) 5. List the advantages and disadvantages of nicotine replacement (C1)	2 hour (T)

Content	Competencies	Number of Hours
	6. List the indication for nitric oxide and explain the effect of inhaled nitric oxide on a patient (C1) 7. List the two toxic products of nitric oxide (C1) 8. List the two inhaled prostacyclin analogues (C1)	
Unit 3: Critical Care, Cardiovascular, and Polysomnography Agents		
Skeletal Muscle Relaxants (Neuromuscular Blocking Agents)	1. Define terms that pertain to skeletal muscle relaxants (C1) 2. List the uses of NMBAs (C1) 3. Explain the physiology of the neuromuscular junction (C2) 4. Explain the makeup of depolarizing and nondepolarizing agents (C2) 5. Explain the uses of administering NMBAs in patients on mechanical ventilation (C2) 6. Identify methods of monitoring neuromuscular blockade (C3)	2
Diuretic Agents	1. Define terms pertaining to diuretic agents (C1) 2. Explain the concepts of renal function, filtration, reabsorption, and acid-base balance (C2) 3. List and explain the various groups of diuretics (C1,C2) 4. List the indications and common side effects for diuretic therapy(C1) 5. Outline special situations related to diuretic therapy (C2)	2
Drugs Affecting the Central Nervous System	1. Define key terms pertaining to drugs that affect the central nervous system (CNS) (C1) 2. Identify various effects of medications on the CNS and their ability to modulate neurotransmitters (C3) 3. Summarise psychiatric medications, including their classification, use, and side-effect profiles (C2) 4. Contrast the physiologic and psychological bases of pain and the classes of analgesics used to treat pain (C2) 5. Identify indications for the use of both local and general anesthesia (C3) 6. Explain the concept of conscious sedation and list the indications and guidelines for use (C2) 7. Compare the drugs that stimulate the CNS and respiratory system, and explain the indications for application (C2)	2
Vasopressors, Inotropes, and Antiarrhythmic Agents	1. Define terms that pertain to vasopressors, inotropes, and antiarrhythmic drugs. (C1) 2. Compare and contrast the mechanism of action of inotropes and vasopressors (C2) 3. Outline the various drug interactions that may	2

Content	Competencies	Number of Hours
	occur with the use of vasopressors and inotropes (C2) 4. Define non pharmacologic methods of treating dysrhythmias (C1) 5. Compare and contrast the categories of the Vaughan Williams classification system (C2) 6. Explain the mechanism of action of digoxin (C2) 7. Explain the proper dosing technique of intravenous magnesium therapy in the management of torsade's de pointes (C2) 8. List the routes of administering medications during cardiac arrest (C1)	
Drugs Affecting Circulation: Antihypertensive Antianginals, Antithrombotic	1. Define terms that pertain to drugs affecting circulation: antihypertensive, antianginals, and antithrombotic (C1) 2. Define hypertensive crisis, and differentiate between hypertensive emergency and hypertensive urgency (C1) 3. Compare and contrast the clinical pharmacology of the agents used for hypertensive pharmacotherapy (C2) 4. Outline the chronotherapeutic effect of blood pressure (C2) 5. Explain the formation and elimination of an acute coronary thrombus (C2) 6. Outline the etiology and pathophysiology of angina and the drugs used to treat angina (C2) 7. List the agents in the antithrombotic classes of anticoagulants, antiplatelets, and thrombolytics and also explain the mechanism of action of heparin (C2) 8. Compare and contrast the clinical pharmacology of heparin, low-molecular-weight heparin (LMWH), aspirin, Clopidogrel, ticlopidine, and dipyridamole(C2) 9. List the laboratory parameters that may be used to monitor for the effect of heparin, LMWH, and direct thrombin inhibitors (C1) 10. Summarize the complications and side effects of antithrombotic drugs (C2) 11. Explain the indication and mechanism of action of glycoprotein II b/III a inhibitors.(C1) 12. List the indications and contraindication of thrombolytic agents.(C1)	2 hour (L) 1 hour (T)

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**39**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	Viva
Assignments/Presentations	

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Quiz / Viva	x	x	x	x	x
Assignments/Presentations	x	x	x	x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	• Douglas S. Gardenhire; Rau's Respiratory Care Pharmacology 9th Edition ISBN-10: 0323075282 ISBN-13: 978-0323075282
	• Padmaja Udaykumar; Textbook of Pharmacology for Dental and Allied Health Sciences 4th Edition ISBN-10: 9789386056856: ISBN-13 978-9386056856
Additional References	• K. D. Tripathi; Essentials of Medical Pharmacology 8th Edition, ISBN-10: 9789352704996: ISBN-13: 978-9352704996

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical - II**
Course code	**RES2231**
Academic Year	Second Year
Semester	IV
Number of Credits	7
Course Prerequisite	The student should have a basic theoretical knowledge on these topic and basic competency skills.
Course Synopsis	At the end of this course student should be able to: • Provide respiratory care to all patients in all intensive care units. • Apply the knowledge and skills necessary to provide appropriate interactions with staff, patients, and families of all ages.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Perform infection control practices (P5)
CO2	Perform the initial assessment in terms of obtaining vitals, history taking and physical examination(P4)
CO3	Recognize and perform the respiratory care & related diagnostic procedures as per the patient requirement(P5)
CO4	Take part in airway management procedures(P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		
CO2	x			x				
CO3			x				x	
CO4					x			x

Course Content and Outcomes:

Content	**Competencies**	**Practical hours**
Unit 1:		
Humidification therapy	1. Identify the requirement of active and passive humidification therapy for each patients(P3) 2. Apply active humidification therapy under aseptic technique to the patient(P4) 3. Identify the optimum humidity, temperature, and proper connections for invasive ventilated patients(P5) 4. Perform timely monitoring regarding adequate water level, temperature, pressure and troubleshooting(P5)	1 hour

Content	Competencies	Practical hours
Unit 2:		
Aerosol Therapy	1. Choose appropriate aerosol generating devices accordingly to the patient's clinical condition. (P3) 2. Explain the procedure and instruct the patient (P1) 3. Choose appropriate interfaces to deliver the aerosol therapy efficiently in noninvasively ventilated patients(P3) 4. Perform aerosol therapy following aseptic practices(P5) 5. Decide the drug and prepare medication as per the dosage required.(P5)	2 hours
Unit 3:		
Airway clearance technique	1. Perform airway clearance when indicated for a patient (P4) 2. Explain the procedure and indication for the procedure before doing (P1) 3. Identify the situation in which airway clearance is contra indicated(P3) 4. Choose the appropriate suction catheters(P3)	2 hour
Unit 4:		
Airway management :Intubation /Assisting Intubation	1. Prepare the equipment's required for intubation and perform airway intubation (P4) 2. Determine whether the airway is inserted properly in trachea with appropriate evaluation technique (P5) 3. Perform appropriate airway cuff inflation with a cuff manometer(P5)	2 hours
Unit 5:		
Cuff pressure management	1. Perform inflation/deflation of cuff for adequate cuff pressure with a cuff manometer (P4) 2. Timely examination of cuff pressure for all the intubated patients(P4) 3. Measure and mark the cuff pressure in patient's record(P5) 4. Identify the clinical features associated with cuff leak(P3)	1 hour
Unit 6:		
Pulse oximetry	1. Identify the appropriate site for locating the pulse oximetry probe (P3) 2. Analyse the monitor for adequate waveforms and set the time limits accordingly(P4) 3. Determine the abnormal wave pattern of SpO_2 monitoring and troubleshoot the issues accordingly (P5)	1 hour
Unit 7:		
Artificial airway management	1. Perform airway clearance as per the indication under aseptic technique(P4) 2. Perform proper positioning of the patient and	2 hours

Content	Competencies	Practical hours
	insertion of airway(P5) 3. Perform proper securing of the artificial airway (P4) 4. Identify any issues associated with artificial airway and troubleshoot it accordingly (P3)	
Unit 8:		
Patient Interview	1. Explain the purpose of the procedure to the patient (P2) 2. Interview the patient about the demographics, chief complaints, history and specific pulmonary symptoms (P3) 3. Perform proper documentation of the patient information(P4)	1 hour
Unit 9:		
Physical Examination	1. Explain the purpose of the procedure to the patient (P2) 2. Select and arrange the equipment's required (P1) 3. Perform inspection of the patient (P4) 4. Perform palpation of the body (P4) 5. Perform percussion, following proper finger position and technique (P4) 6. Perform five-point auscultation (P4) 7. Perform proper documentation of the patient information(P4)	2 hours
Unit 10:		
Gas pressure and Flow regulation	1. Identify the gas content by label and colour (P3) 2. Identify the safety system on large and small cylinder, wall outlets, regulators and flowmeter (P3) 3. Select the proper regulator (P1) 4. Perform the cylinder on and ensure no leak is resent(P4) 5. Demonstrate proper transport and storage appropriate for the type of cylinder and regulator (P5) 6. Perform proper documentation of the patient information(P4)	1 hour
Unit 11:		
Chest physical therapy and postural drainage	1. Perform chest physical therapy and postural drainage as per the indication(P4) 2. Perform close monitoring of patients receiving these therapies and intervene accordingly (P5) 3. Identify the scenarios in which these procedures are contraindicated(P3)	1 hour
Unit 12:		
Capnography	1. Choose appropriate capnographic device and connect it accordingly(P3) 2. Identify the abnormal capnography and intervene accordingly (P5)	1 hour

Content	Competencies	Practical hours
Unit 13:		
PFT	1. Test for the proper functioning of PFT machine(P4) 2. Perform pulmonary function testing (P4) 3. Motivate and guide the patient to perform the test efficiently for a reliable report (P4) 4.Perform Broncho provocation test (P4)	2 hours
Unit 14:		
	1. Identify the normal pulmonary function test reports(P3) 2. Identify the abnormal pulmonary function test reports(P3) 3. Identify the abnormal flow volume and Pressure volume loops in the report (P3) 4. Identify the errors in report and rectify it accordingly in the next attempt(P3)	2 hours

Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic	252	-
Practical	21	63
Revision		
Assessment		-
Total	**273**	**63**

Assessment Methods:	
Formative:	Summative:
Viva	End Semester Exam (Practical)
Competency manual	

Mapping of Assessment with COs:				
Nature of Assessment	CO1	CO2	CO3	CO4
End Semester Exam	**x**	**x**	**x**	**x**
Feedback Process:	End-Semester Feedback			

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Seminars in Respiratory Care**
Course Code	**RES3241**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	The students should have basic knowledge about the fundamental concepts in respiratory care and diseases.
Course Synopsis	The students will learn and present about Fundamentals of applied anatomy and physiology in respiratory care. Understand the various diagnostic and respiratory procedures. Understand in depth the various respiratory disease processes.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain in details the applied anatomy of respiratory and cardiovascular system.(C2)
CO2	Explain the respiratory physiology and its clinical implications.(C2)
CO3	Identify the diagnostic procedures and outline the clinical implementation of these procedures.(C3)
CO4	Outline the procedure for airway management.(C2)
CO5	Explain the respiratory disorders in terms of clinical presentation, etiological factors, pathophysiology, diagnosis and management.(C1)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	**x**						**x**	
CO2		**x**				**x**		
CO3		**x**			**x**			
CO4			**x**	**x**				
CO5								**x**

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours Tutorial**
Unit 1:		
Applied Anatomy in respiratory care	1. Explain the development of respiratory system. (C1) 2. Explain the transition from intra to extra uterine life and post-natal lung development.(C2) 3. Explain anatomy of respiratory tract and	05

Content	Competencies	Number of Hours Tutorial
	pulmonary vascular, lymphatic and nervous systems.(C2) 4. Explain the functional anatomy of heart and its vascular system.(C2) 5. Explain in details the control of cardiovascular system and events of the cardiac cycle.(C2)	
Unit 2:		
Physiology in respiratory care	1. Explain in details the mechanics of ventilation and exhalation with static versus dynamic mechanics.(C2) 2. Explain the work of breathing and distribution of ventilation.(C2) 3. Explain in details the efficiency and effectiveness of ventilation.(C2) 4. Explain the diffusion process of gas exchange and normal variation from ideal gas exchange.(C2) 5. Explain oxygen and carbon dioxide transport.(C2) 6. Explain the abnormalities of gas exchange and transport.(C2)	09
Unit 3:		
Diagnostic Procedure	1. Outline the procedure for arterial blood gas sampling(C2) 2. Explain in detail the acid base disturbances (C2) 3. Explain in detail about the pulmonary function test(C2) 4. Interpret the pulmonary function test reports(C2) 5. Outline the sequential approach of reading a chest radiograph and interpret the abnormality in a CXR (C2) 6. List the parameters that determines oxygenation and apply its use in clinical practice.(C1,C3) 7. List the ventilation parameters and apply its use in clinical practice. (C1,C3) 8. Explain in detail about pulse oximetry monitoring and capnography(C2)	08
Unit 4:		
Airway Management	1. List the supraglottic airway devices and explain each in terms of parts, indication, contraindication, uses and insertion technique(C1,C2) 2. Explain in details the procedure to establish an artificial airway(C2) 3. Explain about airway maintenance and list complication associated with endotracheal	04

Content	Competencies	Number of Hours Tutorial
	tubes(C1,C2) 4. Outline the procedure for extubation (C2)	
Unit 5:		
Respiratory diseases	1. Explain the following diseases in terms of definition, etiology, clinical presentation, risk factors, pathophysiology, diagnosis and management: (C2) • Asthma • COPD • ARDS • VAP • Neuromuscular diseases • OP poisoning • Respiratory failure • Pulmonary embolism • Pneumothorax • Pulmonary edema& effusion • Chest trauma	11

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	**39**	**78**
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		**--**
Total	**39**	**78**
Assessment Methods:		
Formative:		**Summative:**
Unit Test		Mid Semester/Sessional Exam
Quiz		End Semester Exam
Viva		-
Assignments/Presentations		**-**
Clinical assessment (OSCE, OSPE, WBPA)		-
Clinical/Practical Log Book/ Record Book		**-**

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Quiz / Viva				x	
Assignments/Presentations		x		x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Egans Fundamentals of Respiratory care 12th Edition, ***ISBN*** 9780323511124 2. J.M. Cario Pilbeam's Mechanical Ventilation: Physiological and Clinical Applications Edition: Fifth Print ISBN: 978-0-323-09617-1 Electronic ISBN: 978-0-323-29209-2 3. Jameson, Faugi, Harrisons Principle Of Internal Medicine, 20th Edition **ISBN-13:** 978-1259834806
Additional References	1. Cardiopulmonary Anatomy and Physiology, Essentials of respiratory care by Terry R, Des Jardins 6th Edition Mosby publication, ***ISBN***-10: 0840022611;

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Healthcare management and Law**
Course Code	**RES3242**
Academic Year	Second Year
Semester	IV
Number of Credits	3
Course Prerequisite	The students should have basic understanding about administration and statistics used in hospital and health care industry.
Course Synopsis	The students will learn about 1. Basic concepts of hospital management and administration. 2. Operational concept in hospital administration. 3. Fundamentals of various services given by hospital.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the basic concepts and statistics used in hospital administration.(C2)
CO2	Explain the fundamentals of management.(C2)
CO3	Explain various concepts of operational management. (C1)
CO4	Explain the significant concepts of hospital planning.(C1)
CO5	Explain the roles and responsibilities of various services provided in hospital.(C2)
CO6	Explain the risk management strategies and recent advances in hospital administration.(C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2			x					x
CO3				x	x			
CO4							x	x
CO5		x				x		

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours Lecture**
Unit 1:		
Introduction to hospital administration	1. Define hospital administration, roles of administrators, functions and principles of management.(C1) 2. Explain the rationale of hospital administration including the types of hospital administrators.(C2) 3. Explain and understand the role of hospitals and evolution of the hospitals globally.(C2) 4. Explain the types and classification of hospitals and	07

Content	Competencies	Number of Hours Lecture
	the various problem solving strategies implemented in hospitals.(C2) 5. Explain various hospital statistics used.(C2) 6. Explain the scope of research and the legal aspects of hospital administration.(C2) 7. Explain the role of hospitals in the new millennium.(C2)	
Unit 2:		
Introduction to management	1. Explain and understand various approaches to management.(C2) 2. Explain in details about the operational approach and its various functions like: (C2) • Planning • Decision making • Organizing • Staffing • Job designing • Directing • Motivating • Leadership • Communication • Controlling 3. Explain about the organizational behaviour, material and financial management of the hospitals.(C2) 4. Explain various management techniques and industrial relations in hospitals.(C2)	10
Unit 3:		
Hospital planning	1. Explain aims of hospital planning.(C2) 2. List the factors affecting the utilization of the hospital resources.(C1) 3. Explain in details the hospital planning process.(C2)	03
Unit 4:		
Clinical services	1. Explain in details about the management and the administration involved in various clinical service departments such as: (C2) • Outpatient department services • Emergency services department. • Inpatient department • Operation theatre • Intensive care unit • PMR services.	06
Unit 5:		
Diagnostic and therapeutic services	1. Explain in details about the management and the administration involved in various diagnostic and therapeutic service departments such as: (C2) • Laboratory services • Radiology services	04

Content	Competencies	Number of Hours Lecture
	• Pharmacy services • Transfusion services	
Unit 6:		
Support and utility services	1. Explain and explain in details working, management and administration for the following services: (C2) • Medical records department • Central sterile supply department • Linen and laundry services • Dietary services • Hospital housekeeping services • Hospital engineering services • Hospital transportation system • Hospital equipment management • Public relations in hospital • Mortuary services of hospital	**05**
Unit 7:		
Risk management	1. Explain the functioning and management of: (C2) • Hospital waste management • Nosocomial infections • Disaster management • Hospital security services • Occupational safety in hospital	**02**
Unit 8:		
Recent advances in hospital management	1. Explain the various aspects of contracting in health care.(C2) 2. Explain various health care plans and challenges in healthcare financing in India.(C2) 3. Explain the current place and role of health care insurances.(C2) 4. Explain the roles and responsibilities of quality control maintenance in health care organization(C2) 5. Explain the role of media and developing a strategy to involve media for hospital publicity.(C2) 6. Explain the significance of telemedicine and medical tourism as a managerial aspect.(C2)	**02**

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	78
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		

Practical		
Revision		
Assessment		-
Total	**39**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam
Quiz	End Semester Exam
Viva	-
Assignments/Presentations	**-**

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Quiz / Viva	x	x	x	x	x
Assignments/Presentations	-	-	-	-	-
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. DC Joshi, Mamta Joshi, Hospital Administration, ISBN 9788184486766
Additional References	1. Jaydeep das Gupta, *Hospital Administration and Management: A Comprehensive Guide,edition:, ISBN* 9788184486025

SEMESTER - V

COURSE CODE	:	COURSE TITLE
RES3121	:	Mechanical Ventilation - I
RES3101	:	Neonatal Respiratory Care
RES3102	:	Critical Care Monitoring and Management
RES3131	:	Clinical - III
*** ****	:	Open Elective - II

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Mechanical Ventilation - I**
Course Code	**RES3121**
Academic Year	Third Year
Semester	V
Number of Credits	3
Course Prerequisite	Student should have a basic knowledge on how ventilator works.
Course Synopsis	1. This module helps the student to clearly understand basic concept and core knowledge in mechanical ventilation. 2. To understand conventional modes and higher modes of ventilation and to identify and explain the primary characteristics of ventilator design 3. To able to analyze patient condition and to know how to initiate mechanical ventilation as therapeutic intervention

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Define the basic concept of mechanical ventilation(C1,P1)
CO2	Explain conventional modes of ventilation and explain primary characteristics of ventilator design(C2,P2)
CO3	Application of mechanical ventilation as therapeutic intervention.(C3,P4)
CO4	Analyse patient condition and know how to initiate and monitor mechanical ventilation(C4,P5)
CO5	Determine the ventilator parameters according to the patient lung conditions and concerns(C5,P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2		x						
CO3			x	x				
CO4					x	x		
CO5							x	x

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**
Unit 1: **Basic Concepts and Core Knowledge in Mechanical Ventilation**		
1. Basic Terms and Concepts of Mechanical Ventilation: Physiological Terms and Concepts Related to Mechanical	1. Define ventilation and respiration (C1,P1) 2. Explain gas flow and pressure gradients during ventilation (C2.P2) 3. Define pressures, their units and gradients in the lungs (C1,P1) 4. Explain the lung characteristics including	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
Ventilation	resistance and compliance (C2,P2) 5. Explain airway condition that can lead to abnormal lung characteristics (C2,P1) 6. Explain the calculation of compliance and resistance (C2,P2) 7. Illustrate the graphical representation of lung characteristics (C2,P2) 8. Compare several time constants and explain how different time constants will affect volume distribution (C4,P4)	
2. Basic Terms and Concepts of Mechanical Ventilation: Types of Ventilators and Terms Applied to Mechanical ventilation	1. Explain types of mechanical ventilation: Negative pressure ventilation, Positive pressure ventilation and High frequency ventilation.(C2,P2) 2. Define and measure: baseline pressure, peak pressure, plateau pressure, pressure at end of exhalation (C1,P1)	1 hour (L) 1 hour (P)
3. How Ventilators Works	1. List the basic types of power sources used for mechanical ventilators (C1,P1) 2. Explain the difference between positive and negative pressure ventilators. (C2,P2) 3. Distinguish between a closed-loop and open-loop system (C4,P3) 4. Define user interface (C1,P1) 5. Explain a ventilators internal and external pneumatic circuits (C2,P1) 6. Identify the difference between single and double circuit ventilator (C3,P3) 7. Identify the components of patient circuit (C3,P3) 8. Explain the function of an externally mounted exhalation valve (C2,P2) 9. Compare the functions of the 3 types of volume displacement drive mechanism. (C4,P4) 10. Explain the function of the proportional solenoid valve (C2,P1)	1 hour (L) 1 hour (P)
4. How a Breath is Delivered	1. Compare pressure, volume, and delivery in volume controlled breaths and pressure control breaths.(C4,P4) 2. Define two patient triggered variables and identify the patient trigger variable that requires least work of breathing for a patient receiving mechanical ventilation (C1,P1) 3. Explain the effect on the volume delivered and the inspiratory time if a ventilator reaches the pre-set maximum pressure limit during volume ventilation (C2,P2) 4. Identify the effects of a critical leak on pressure readings and volume	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
	measurements (C3,P3) 5. Explain the effects of inflation hold on inspiratory time (C2,P2) 6. Identify the clinical situations where expiratory resistance is increased based on the description of a pressure –time graph.(C3,P3) 7. Explain two methods of applying continuous pressure to the airways that can be used to improve oxygenation in patients with refractory hypoxemia.(C2,P2)	
Unit 2: Initiating Ventilation		
1. Establishing the need for Mechanical Ventilation	1. Distinguish between acute respiratory failure (ARF) and respiratory insufficiency.(C4,P4) 2. Explain the goals and objectives of mechanical ventilation(C2,P2) 3. Identify three categories of disorders that may lead to respiratory insufficiency or ARF(C3,P3) 4. Compare normal values for the vital capacity, maximum inspiratory force, peak expiratory pressure, forced expiratory volume in 1 second, peak expiratory flow rate, physiological dead space/tidal volume ratio, alveolar- arterial oxygen pressure difference, and arterial to alveolar partial pressure of oxygen ratio with abnormal values that indicate the need for ventilator support. (C4.P4)	1 hour (L) 1 hour (P)
1. Selecting the Ventilator and the Mode I	1. Outline how to select an appropriate mechanical ventilation mode based on clinical findings derived from patient assessment data(C2,P2) 2. Explain how CPAP and NIV are used to deliver non-invasive positive-pressure ventilation (C2,P2) 3. Compare the advantage and disadvantage of volume controlled and pressure controlled ventilation(C4,P4) 4. Explain the differences in function among CMV,SIMV and spontaneous ventilation.(C2,P2) 5. Apply the terms trigger, cycle and limit to define ventilation modes (C3,P4)	1 hour (L) 1 hour (P)
7. Selecting the Ventilator and the Mode II	1. Define Higher modes(C2,P2) 2. Illustrate with examples of the types patients who would benefit most from each mode of ventilation (C2,P2)	1 hour (L) 1 hour (P)
8. Initial Ventilator Settings: Initial settings	1. Outline Initial settings during volume control ventilation(C2,P2)	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
during Volume Ventilation	2. Identify how to set minute ventilation and special considerations (C3,P3) 3. Demonstrate and explain Inspiratory pause during volume ventilation (C2,P2)	
9. Initial Ventilator Settings: Determining initial Ventilator Settings during Pressure Ventilation	1. Outline how to set baseline pressure-physiological PEEP(C2,P2) 2. Determining volume delivery in pressure ventilation (C5,P5,) 3. Outline how to set Initial settings of positive pressure ventilation modes(C2,P2) 4. Choose Initial settings of positive pressure ventilation modes with volume targeting (C3.P3)	1 hour (L) 1 hour (P)
10. Final Consideration in Ventilator Setup: Selection Additional Parameters and Final Ventilator Setup	1. Identify the need for the selection of fractional concentration of inspired oxygen (C3,P3) 2. Outline how to set sensitivity (C2,P2) 3. List different type of Humidification (C1,P1) 4. Determine how to set Alarms and its troubleshooting (C4,P4) 5. Take part in preparing the patient, establishing an interface, manual ventilation, cardiovascular stabilization, ventilator needs and treating the cause of respiratory failure(C4,P4) 6. Decide on selection and evaluation of appropriate ventilator and its performance(C5,P5)	1 hour (L) 1 hour (P)
11. Final Consideration in Ventilator Setup: Initial Ventilator Settings for Specific Patients Situations	1. Determine initial ventilator settings from the guidelines for patient management by assessing following patient conditions(C5,P5) • Chronic Obstructive Pulmonary Disease • Neuromuscular diseases • Asthma • Closed Head Injury • Acute Respiratory Distress syndrome Acute cardiogenic pulmonary edema and Congestive Heart Failure	1 hour (L) 1 hour (P)
Unit 3: Monitoring in Mechanical Ventilation		
12. Initial Patient Assessment I	1. Identify the need for documentation of the patient –ventilator system including : mode , sensitivity, tidal volume, rate and minute ventilation, alveolar ventilation (C3) 2. Determine and Correct tube compliance (C5,P5) 3. Analyse and monitor airway pressures (C4) 4. Test circuits for leaks (C4,P4) 5. Assess vital signs, blood pressure and physical examination of chest (C5,P5)	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
13.Initial Patient Assessment II	1. Outline how to Manage endotracheal tube and tracheostomy tube cuffs(C2,P2) 2. Demonstrate and explain how to Measure cuff pressure (C2,P2) 3. Outline how to Monitor compliance and airway resistance.(C2,P2) 4. Interpret PV curves, its measurement and application(C5,P5)	1 hour (L) 1 hour (P)
14. Ventilator Graphics: Volume Control Ventilation with Constant Flow, Pressure Control Ventilation, Pressure Support Ventilation	1. Identify ventilator variables and parameters and their values from flow volume and pressure volume loops(C3,P3) 2. Outline ventilator graphics and calculations(C2,P2) 3. Explain the variations in flow time scalar in volume controlled CMV(C2,P2) 4. Explain changes in pressure time curve(C2,P2) 5. Explain volume scalar(C2,P2) 6. Compare pressure controlled ventilation and volume controlled ventilation(C2,P2) 7. Identify changes in compliance during pressure controlled CMV(C3,P3) 8. Explain active inspiration and expiration with graphics(C2,P2) 9. Define inspiratory rise time control: sloping or ramping(C1,P1) 10. Explain PSIMV plus CPAP(C2,P2) 11. Explain pressure-time waveform in Pressure Support Ventilation (C2,P2) 12. Explain mechanism of flow cycling during PSV (C2,P2) 13. Explain automatic adjustment of the flow cycle criterion (C2,P2)	1 hour (L) 1 hour (P)
15. Ventilator Graphics: Use of Pressure Support Ventilation with SIMV and Flow Volume Loops During Mechanical Ventilation	1. List the components of pressure volume loop(C1,P1) 2. Explain changes in pressure volume loop with changes in flow, compliance and airway resistance (C2,P2) 3. Identify and analyse spontaneous breath by observing P-V loop (C3) 4. Evaluate work of breathing using P-V loop(C5,P5) 5. Analyse and trouble shoot P-V loop(C4,P4) 6. List the components flow volume loop(C1,P1,P1) 7. Identify the variations in flow and flow waveforms using flow- volume loop (C3) 8. Analyse airway resistance and evaluation of bronchodilator therapy using flow- volume loop(C4,P4) 9. Analyse and trouble shoot Flow-volume loop(C4,P4)	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
16. Assessment of Respiratory Function: Non-invasive Measurement of Blood Gases	1. Explain the physiologic and technical concerns of pulse oximetry(C2,P2) 2. Assess patient clinically using pulse oximetry (C5,P5) 3. Explain Technical and physiologic considerations of capnography (C2,P2) 4. Assess patient clinically using capnography (C5,P5) 5. Explain transcutaneous monitoring and its technical considerations (C2,P2)	1 hour (L) 1 hour (P)
17. Assessment of Respiratory Function: Indirect Calorimetry, Metabolic Measurements and Assessment of Respiratory Systems Mechanics	1. Explain the major components of an indirect calorimeter(C2,P2) 2. Explain clinical applications of metabolic monitoring in critically ill patients(C2,P2) 3. List devices that are used to measure airway pressure, volumes, and flows during mechanical ventilation(C1,P1) 4. Outline how to Measure airway pressures and flow(C2,P2) 5. Explain the pressure-time product and its application(C2,P2)	1 hour (L) 1 hour (P)
18. Hemodynamic Monitoring	1. Explain factors influencing cardiac output(C2,P2) 2. Name the major components of hemodynamic monitoring system(C1,P1) 3. Explain the proper technique for insertion and maintenance of a systemic arterial line and list the most common complications associated(C2,P2) 4. Explain the procedure for the insertion and placement of central venous line and balloon floatation, flow directed pulmonary artery catheter and list possible complications associated.(C2,P2) 5. Interpret the waveforms generated during the insertion of a pulmonary artery catheter(C5,P5) 6. List normal values for measured and derived values of hemodynamic variables(C1,P1) 7. Interpretation of hemodynamic profiles (C2,P5)	1 hour (L) 1 hour (P)
Unit 4:Therapeutic Intervention – Making Appropriate Changes		
19. Method to Improve Ventilation in Patient Ventilator Management: Correcting Ventilation Abnormalities	1. Decide ventilator adjustments to reduce work of breathing and improve ventilation based on patient diagnosis, arterial blood gas results, and ventilator parameters(C5,P5) 2. Explain effects of Increased physiological dead space increased metabolism and increased carbon dioxide production in ventilation and its correction(C2,P2)	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
	3. Explain iatrogenic hyperventilation and permissive hypercapnia and its application(C2,P2)	
20. Method to Improve Ventilation in Patient Ventilator Management: Airway Clearance During Mechanical Ventilation	4. List hazards and complications of suctioning(C1,P1) 5. Compare the benefits of closed suction catheters to open suction technique(C2,P2) 6. Explain the technique of continuous aspiration subglottic secretion(C2,P2) 7. Explain the pros and cons of instilling normal saline to loosen secretion before suctioning(C2,P2) 8. Assess the patient following suctioning(C5,P5) 9. List the clinical findings that are used to establish the presence of a respiratory infection(C1,P1) 10. List the types of aerosol generating devices (C1,P1) 11. Outline how to use pMDIs nd SVNs during mechanical ventilation(C2,P2) 12. List technical problems associated with continuous nebulization(C1,P1) 13. Identifying patients response to bronchodilator therapy(C3,P3) 14. Explain the procedures of postural drainage and chest percussion(C2,P2) 15. Explain the significance of Flexible fibre optic bronchoscopy(C2,P2)	1 hour (L) 1 hour (P)
21. Method to Improve Ventilation in Patient Ventilator Management: Additional Patient Management Techniques and Therapies in Ventilated Patients	1. Explain the importance of body position and positive pressure ventilation(C2,P2) 2. Explain the positioning in a patient with ARDs, prone positioning and positioning in unilateral lung disease(C2,P2) 3. List the complications associated with the in-house transport of mechanically ventilated patient(C1,P1)	1 hour (L) 1 hour (P)
22. Improving Oxygenation and Management of ARDS: Basics of Oxygenation Using FIO2, PEEP Studies, and Pressure – Volume Curves for Establishing Optimum PEEP	1. Evaluating PaO2,SpO2 and FiO2 in ventilator patients(C5,P5) 2. Determine how to adjust FiO2 or mean airway pressure(C5,P5) 3. Identify indications and contra indications of CPAP and PEEP(C3,P3) 4. Decide when to and how to Initiate PEEP therapy(C5,P5) 5. Explain how to monitor pulmonary vascular pressure with PEEP(C2,P5) 6. Explain contraindications and physiological effects of PEEP(C2,P2)	1 hour (L) 1 hour (P)

Content	Competencies	Number of hours
	7. Decide when to and how to wean from PEEP therapy(C5,P5)	
23. Improving Oxygenation and Management of ARDS: Acute Respiratory Distress Syndrome	1. Explain pathophysiology of ARDS(C2,P2) 2. List changes in CT with ARDS(C1,P1) 3. Make use of lung protective strategies in ARDS(C3) 4. Explain long term follow up in ARDS(C2,P2) 5. Recommend ,initiate and Manage recruitment and De recruitment manures (C5,P5)	1 hour (L) 1 hour (P)
24. COPD: Chronic Obstructive Pulmonary Disease Management	1. Explain pathophysiology of COPD(C2,P2) 2. Choose Ventilator settings in COPD(C3) 3. Identify the possible challenges in ventilation in COPD patients.(C3) 4. Determine how to improve ventilation/oxygenation in COPD patients.(C5,P5) 5. Decide ventilator management for COPD.(C5,P5)	1 hour (L) 1 hour (P)
25.Asthma: Management	1. Explain pathophysiology of Asthma(C2,P2) 2. Choose Ventilator settings in Asthma.(C3.P3) 3. Identify the possible challenges in ventilation in Asthma patients.(C3,P3) 4. Determine how to improve ventilation/oxygenation in Asthma patients.(C5,P5) 5. Decide ventilator management for Asthma.(C5,P5)	1 hour (L) 1 hour (P)
26.Pulmonary Edema: Management	1. Explain pathophysiology of Pulmonary Edema.(C2,P2) 2. Choose Ventilator settings in Pulmonary edema.(C3,P3) 3. Identify the possible challenges in ventilation in Pulmonary Edema patients. (C3,P3) 4. Determine how to improve ventilation/oxygenation in Pulmonary Edema patients.(C5,P5) 5. Decide ventilator management for Pulmonary edema.(C5,P5)	1 hour (L) 1 hour (P)

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	78
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical	26	-
Revision		
Assessment		-
Total	**52**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	
Assignments/Presentations	

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x				
Quiz / Viva	x	x	x	x	x
Assignments	x		x	x	
Clinical/Practical Log Book/ Record Book			x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Author(s): J.M. Cario Pilbeam‘s Mechanical Ventilation: Physiological and Clinical Applications Edition: Fifth Print ISBN: 978-0-323-09617-1 Electronic ISBN: 978-0-323-29209-2
Additional References	1. Hess, D. R., & Kacmarek, R. M. (2018). Essentials of Mechanical Ventilation, Fourth Edition. New York, United States: McGraw-Hill Education. ISBN**:** 9781260026092

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Neonatal Respiratory Care**
Course Code	**RES3101**
Academic Year	Third Year
Semester	V
Number of Credits	3
Course Prerequisite	Student should have a basic knowledge on neonatal respiratory system
Course Synopsis	1.This module is an introduction to neonatal respiratory physiology and lung mechanics 2.To understand the basics and fundamentals on neonatal resuscitation 3. To identify the clinical features and diagnostic technique of neonatal respiratory disorder. 4. To understand the management of different respiratory disorder accordingly

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the fetal lung development and gas exchange (C1)
CO2	Explain the neonatal resuscitation guidelines (C2)
CO3	Choose the assessment and monitoring systems to identify the underlying lung pathology (C3)
CO4	Explain the pathophysiology, etiology and clinical features of different respiratory disorders (C1)
CO5	Analyze the general , specific and ventilator management in neonates (C4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x							
CO2		x			x			
CO3	x		x					
CO4				x			x	
CO5						x		x

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**
Unit 1:		
Fetal lung development,fetal gas exchange and circulation	1. List the five stages of fetal lung development and the gestational age at which they occur (C1) 2. Name the three fetal shunts and explain their role during fetal circulation (C1) 3. Explain the direction of blood flow and relative vascular pressures in the placenta, umbilical vein, three fetal shunts, right-side heart chambers, left-	1 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	side heart chambers, pulmonary artery, lungs, aorta, and umbilical arteries (C2)	
Unit 2:		
AHA ILCOR NRP Guidelines with recent updates	1. Explain the initial steps of resuscitation and illustrate the NRP algorithm(C2) 2. Demonstrate the use of resuscitation device, endotracheal intubation and chest compression (C2) 3. List the medications used and the dosage. (C1) 4. Explain the resuscitation of preterm babies (C2)	1 hour (L) 2 hour (T)
Unit 3:		
Thermoregulation	1. Explain the physiology of thermoregulation(C2) 2. Identify mechanisms of thermoregulation(C3) 3. Explain the consequences of inadequate thermoregulation in neonates(C2) 4. Identify strategies to support thermoregulation (C3) 5. Identify sources of heat loss (C3)	2 hour
Unit 4 :		
Respiratory distress syndrome	1. Define Respiratory distress syndrome (C1) 2. List the risk factors associated with the disease(C1) 3. Explain the pathophysiology and etiology (C2) 4. List the clinical features and diagnostic features (C1) 5. Analyze the prevention and therapeutic approach for RDS (C4) 6. Illustrate the initial ventilator strategy and weaning strategy in RDS (C2) 7. List the differential diagnosis for the RDS (C1) 8. Explain the complication associated and prognosis (C2)	2 hour (L) 2 hour (T)
Unit : 5		
Meconium aspiration syndrome	1. Define Meconium aspiration syndrome (C1) 2. Classify Meconium aspiration syndrome(C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2) 5. Identify the clinical features and diagnostic approach (C3) 6. Analyze the prevention and therapeutic approach for MAS (C4) 7. Illustrate the initial ventilator strategy and weaning strategy in MAS (C2) 8. List the differential diagnosis for MAS (C1) 9. Explain the complication associated and prognosis (C2)	2 hour (L) 1 hour (T)
Unit : 6		
Apnea of prematurity	1. Define Apnea of prematurity (C1)	1 hour

Content	Competencies	Number of hours
	2. Classify apnea of prematurity(C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2) 5. Identify the clinical features and diagnostic approach (C3) 6. Illustrate the initial ventilator strategy and weaning strategy in apnea of prematurity (C2) 7. Analyze the prevention and therapeutic approach for apnea of prematurity(C4) 8. List the differential diagnosis for apnea of prematurity (C1) 9. Explain the complication associated and prognosis (C2)	-
Unit :7		
Transient tachypnea of the neonate	1. Define Transient tachypnea of newborn (C1) 2. List the risk factors associated with the disease(C1) 3. Explain the pathophysiology and etiology (C2) 4. Identify the clinical features and diagnostic approach (C3) 5. Illustrate the ventilator strategy in TTNB(C2) 6. Analyze the prevention and therapeutic approach for TTNB(C4) 7. List the differential diagnosis for TTNB (C1) 8. Explain the complication associated and prognosis (C2)	1 hour -
Unit: 8		
Bronchopulmonary dysplasia	1. Define Bronchopulmonary dysplasia (C2) 2. Classify Bronchopulmonary dysplasia (C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2) 5. Identify the clinical features and diagnostic approach (C3) 6. Illustrate the initial ventilator strategy and weaning strategy in BPD (C2) 7. Analyze the prevention and therapeutic approach for BPD(C4) 8. List the differential diagnosis for BPD(C1) 9. Explain the complication associated and prognosis (C2)	2 hour (L) 1 hour (T)
Unit:9		
Persistent pulmonary hypertension of the neonate	1. Define Persistent pulmonary hypertension of the neonate (C1) 2. Classify Persistent pulmonary hypertension of the neonate (C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2)	1 hour

Content	Competencies	Number of hours
	5. Identify the clinical features and diagnostic approach (C3) 6. Illustrate the ventilator management in PPHN (C2) 7. Analyze the prevention and therapeutic approach for PPHN (C4) 8. List the differential diagnosis for PPHN(C1) 9. Explain the complication associated and prognosis (C2)	
Unit:10		
Congenital diaphragmatic hernia	1. Define Congenital diaphragmatic hernia (C1) 2. Classify Congenital diaphragmatic hernia based on the anatomical abnormality (C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2) 5. Identify the clinical features and diagnostic approach (C3) 6. Illustrate the ventilator management for pre and post surgical management of CDH (C2) 7. Analyze the prevention and therapeutic approach for (C4) 8. List the differential diagnosis for CDH(C1) 9. Explain the complication associated and prognosis (C2)	1 hour
Unit:11		
Tracheoesophageal fistula	1. Define tracheo-esophageal fistula (C1) 2. Classify Tracheoesophageal fistula (C4) 3. List the risk factors associated with the disease(C1) 4. Explain the pathophysiology and etiology (C2) 5. Identify the clinical features and diagnostic approach (C3) 6. Illustrate the ventilator management for TEF (C2) 7. Analyze the prevention and therapeutic approach for (C4) 8. List the differential diagnosis for TEF(C1) 9. Explain the complication associated and prognosis (C2)	1 hour
Unit:12		
Congenital cardiac defects	1. Explain normal cardiac anatomy and blood flow in newborn (C2) 2. Define *shunt* and understand the different types of shunts seen with CHD (C1) 3. Classify congenital cardiac defects(C4) 4. Explain the most common congenital cardiac defects (C2) 5. Identify the various causes of changes in pulmonary vascular resistance (C3) 6. Illustrate the ventilator strategies commonly used	2 hour (L) 2 hour (T)

Content	Competencies	Number of hours
	among various congenital cardiac defects(C2)	
Unit 13		
Asphyxia in the neonate	1. Explain asphyxia in neonate (C2) 2. List the risk factors associated with the disease(C1) 3. Explain the pathophysiology and etiology (C2) 4. identify the clinical features and diagnostic approach (C3) 5. Analyze the prevention and therapeutic approach for (C4) 6. List the differential diagnosis for asphyxia(C1) 7. Explain the complication associated and prognosis (C2)	1 hour
Unit: 14		
Pulmonary haemorrhage	1. Explain Pulmonary haemorrhage in neonate (C2) 2. List the risk factors associated with the disease(C1) 3. Explain the pathophysiology and etiology (C2) 4. Identify the clinical features and diagnostic approach (C3) 5. Illustrate the ventilator management for pulmonary haemorrhage (C2) 6. Analyze the prevention and therapeutic approach for (C4) 7. List the differential diagnosis for Pulmonary haemorrhage (C1) 8. Explain the complication associated and prognosis (C2)	1 hour
Unit:15:		
Pulmonary air leak	1. Explain pulmonary air leak in neonate (C2) 2. List the risk factors associated with the disease(C1) 3. Explain the pathophysiology and etiology (C2) 4. Identify the clinical features and diagnostic approach (C3) 5. Illustrate the ventilator management and weaning strategy in pulmonary air leak (C2) 6. Analyze the prevention and therapeutic approach for (C4) 7. List the differential diagnosis for pulmonary air leak(C1) 8. Explain the complication associated and prognosis (C2)	1 hour
Unit 16:		
Chest radiographic assessment	6. Identify normal chest structures (C3) 7. Examine the chest radiograph for proper placement of endotracheal tubes and vascular catheters (C4) 8. List the disease specific salient chest radiograph	1 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	feature(C1)	
Unit 17:		
Non-invasive ventilation strategies	1. Explain the effects of NPPV on respiratory function(C2) 2. Explain the effects of NPPV from CPAP on respiratory function(C2) 3. Explain the mechanism of high flow nasal cannula (C2) 4. Identify the suitable interface for neonates(C3) 5. Identify the complications resulting from non-invasive ventilation(C3) 6. Explain the weaning from non invasive ventilation(C2)	1 hour (L) 1 hour (T)
Unit18:		
Continuous Positive Airway Pressure	1. Explain the various physiological effects of CPAP (C2) 2. Explain the indications/contraindications for CPAP (C2) 3. Identify commonly used delivery systems and nasal interfaces for delivering CPAP (C3) 4. Outline the various strategies used to manage patients receiving CPAP and how these may impact outcomes(C2) 5. Explain monitoring strategies for determining positive and negative responses to CPAP(C2) 6. Identify common complications and how they can be avoided when using CPAP(C3) 7. Illustrate the various weaning strategies that have been used for withdrawing CPAP in infants(C2)	1 hour (L) 1 hour (T)
Unit 19:		
Surfactant replacement therapy	1. Explain how surfactant affects surface tension and improves lung function(C2) 2. Identify disease processes associated with surfactant deficiency, dysfunction, or inactivation (C3) 3. Explain the delivery, benefits, and adverse effects of surfactant replacement (C2) 4. Identify patients and disease processes that may benefit from surfactant replacement therapy (C3)	1 hour
Unit 20:		
Invasive ventilation strategies in different disease conditions	1. Identify the indication for invasive ventilation (C3) 2. Explain the disease specific ventilation(C2) 3. Outline the criteria to switch over to higher mode of ventilation(C2) 4. Illustrate the weaning strategy from invasive ventilation(C2)	2 hour (L) 1 hour (T)

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**39**	**78**

Assessment Methods:	
Formative:	Summative:
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	
Assignments/Presentations	

Mapping of Assessment with COs					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Assignments	x		x	x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. Brian K Walsh. Neonatal and Pediatric Respiratory Care ISBN:978-145-575-3192 2. APA AHA ILCOR Neonatal Resuscitation. 7th edition. ISBN 978-93-5025-776-0 3. John P Cloherty. Manual of Neonatal Care.7th edition.ISBN-13: 978-1451118117
Additional References	1. Goldsmith Karotkin Assisted Ventilation of neonate, 6th edition. ISBN-13: 978-0323390064

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Critical Care Monitoring and management**
Course Code	**RES3102**
Academic Year	Third Year
Semester	V
Number of Credits	3
Course Prerequisite	Student should have knowledge on life threatening emergencies that affects the cardiopulmonary system.
Course Synopsis	1. This subject will familiarize various emergency practices used in cardiothoracic intensive care unit 2. To understand and identify the various life threatening disease conditions occurring in the intensive care unit 3. To be able to use appropriate therapeutic and pharmacologic interventions in different critical cardiothoracic conditions.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Identify the causes of various disease conditions in the ICU (C1)
CO2	Explain the pathophysiology of life threatening disease conditions occurring in ICU (C2)
CO3	Explain the pharmacological and non-pharmacological strategy for different disease conditions (C2)
CO4	Choose Appropriate therapeutic procedures for disease conditions affecting cardio pulmonary system (C1)
CO5	Explain the important cardiopulmonary therapeutic procedures performed in the intensive care unit C2)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x					x	
CO2					x	x		
CO3	x			x				
CO4		x	x					
CO5	x							x

Course Content And Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Shock		
Hypovolemic shock	1. Define hypovolemic shock(C1) 2. List the causes leading to hypovolemia (C1) 3. List the clinical features(C1) 4. Explain the treatment strategy in ICU setting(C2)	1
Cardiogenic shock	1. Define cardiogenic shock shock(C1) 2. List the causes leading to cardiogenic shock(C2)	1 hour (L) 1 hour (T)

Content	Competencies	Number of Hours
	3. List the clinical features(C1) 4. Explain the treatment strategy in ICU setting(C2)	
Obstructive shock	1. Explain the different types of obstructive shock(C2) 2. Explain the effects associated with obstructive shock on different organ system.(C2) 3. Explain the gold standard diagnostic techniques for different types of obstructive shock(C2) 4. Explain the emergent management strategies in ICU setting(C2)	1 hour (L) 1 hour (T)
Septic shock	1. Define sepsis and septic shock(C1) 2. List the different microorganisms involved in septic shock(C1) 3. Explain the pathophysiology of sepsis(C2) 4. Explain the steps involved in the diagnosis of septic shock(C2) 5. Explain the management strategy in ICU setting(C2)	1 hour (L) 1 hour (T)
Unit 2: Heart failure		
Congestive heart failure	1. Define congestive heart failure(C1) 2. List the etiological factor(C1) 3. Explain the pathophysiology(C2) 4. Explain the tests involved to diagnose congestive heart failure (C2) 5. Explain the pharmacological and non-pharmacological strategies for treatment of CHD (C2)	2 hour (L) 1 hour (T)
Unit 3: Cerebrovascular accident		
Stroke	1. Define stroke(C1) 2. Explain the different types of stokes and its causes(C2) 3. List the modifiable and non-modifiable risk factors(C1) 4. Explain the methods to diagnose stroke(C2) 5. Explain the management strategy in ICU for stroke(C2)	2
Unit 4: Chest trauma		
Flail Chest	1. Define flail chest (C1) 2. Explain the pathophysiology (C2) 3. List the important clinical features of flailchest (C1) 4. Explain the diagnosis and management of flail chest (C2)	1
Tension pneumothorax	1. Define tension pneumothorax(C1) 2. Explain the pathophysiology(C2) 3. List the clinical manifestations associated with tension pneumothorax(C1) 4. Explain the gold standard technique to diagnose in ICU setting(C2)	1 hour (L) 1 hour (T)

Content	Competencies	Number of Hours
	5. Choose the appropriate therapeutic procedure (C1) 6. Explain the emergent management strategy for tension pneumothorax in ICU setting(C2)	
ICD insertion and underwater seal system	1. Explain intercostal drainage tube and underwater seal system(C2) 2. List the indications and contraindications(C1) 3. Explain the procedure of insertion(C2) 4. List the complications associated with ICD insertion(C1)	1 hour (L) 1 hour (T)
Unit 5: Renal emergencies		
Acute renal failure	1. Define acute renal failure (C1) 2. Classification based on different guidelines (C2) 3. Explain the pathophysiology and the effect of ARF on pulmonary system (C2) 4. Explain the diagnosis and management of acute renal failure (C2)	1 hour (L) 1 hour (T)
Chronic renal failure	1. Define Chronic renal failure (C1) 2. Explain the pathophysiology (C2) 3. Explain the diagnosis and management of acute renal failure (C2) 4. Explain the effect of chronic renal failure on pulmonary system	1 hour (L) 1 hour (T)
Renal replacement therapy	1. Explain the principles of renal replacement therapy (C2) 2. List the indications (C1) 3. Classify renal replacement therapy and differentiate between them (C2) 4. Explain the set up and procedure of haemodialysis and peritoneal dialysis (C2) 5. List the cardiopulmonary complications of RRT (C1)	2
Unit 6: Cardiac emergencies		
Cardiac arrhythmias	1. Summarize the procedure of ECG and normal interpretation (C2) 2. Explain and define various shockable and non-shockable cardiac arrhythmia (C1,C2) 3. Explain the causes, clinical features and management of cardiac arrhythmias (C2)	2 hour (L) 1 hour (T)
Cardiac Pacemaker	1. List the indications for cardiac pacemaker (C1) 2. Explain the different types of pacemaker (C2) 3. Explain the insertion procedure of each type of pacemaker (C2) 4. List the complications(C1)	2 hour (L) 1 hour (T)
Coronary Artery Bypass Grafting (CABG)	1. List the indications for CABG (C1) 2. Explain the procedure of CABG (C2) 3. Explain the respiratory care management post procedure (C2) 4. List the complications(C1)	1 hour (L) 1 hour (T)

Content	Competencies	Number of Hours
Unit 7: Hemodynamic monitoring		
Pulmonary artery catheterization (PAC)	1. List the indications for PAC (C1) 2. Explain the insertion procedure of pulmonary artery catheterization (C2) 3. Interpret the different waveforms of PAC insertion (C2) 4. List the clinical use of PA catheters (C1) 5. List the complications(C1)	2
Arterial line insertion and monitoring	1. List the indications for arterial line insertion (C1) 2. Explain the pre requisites, site selection and the preparation for arterial line insertion (C2) 3. Explain the site insertion procedure of arterial catheterization (C2) 4. Explain the process of zeroing of arterial line (C2) 5. List the complications(C1)	2 hour (L) 1 hour (T)
Intracranial pressure (ICP) monitoring	1. List the indications for ICP monitoring (C1) 2. Explain the physiology of intracranial pressure regulation (C2) 3. Explain the causes and pathophysiology of increased ICP (C2) 4. Explain the different methods to identify increased ICP (C2) 5. Explain the management of increased ICP (C2)	2 hour (L) 1 hour (T)

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		-
Revision		
Assessment		-
Total	39	78
Assessment Methods:		
Formative:	**Summative:**	
Unit Test	Mid Semester/Sessional Exam (Theory)	
Quiz	End Semester Exam (Theory)	
Viva		
Assignments/Presentations		

Mapping of Assessment with COs:					
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Mid Semester / Sessional Examination 1	x	x	x		
Quiz	x	x	x	x	x
Assignments	x	x	x	x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	• Andrew D Bersten, Ohs Intensive Care Manual, Eighth Edition: ISBN: 9780702076060 • Tintinalli's Emergency Medicine: A Comprehensive Study Guide, Ninth editions, ISBN: 1260019934 • Paul L Marino: The ICU Book :4th edition, ISBN: 9781451121186
Additional References	• Rajgopal K Shenoy, Manipal Manual of Surgery: 4th edition, ISBN: 9788123924168

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical - III**
Course code	**RES3131**
Academic Year	Third Year
Semester	V
Number of Credits	8
Course Prerequisite	The student should have a basic theoretical knowledge on these topics and basic competency skills related to them
Course Synopsis	At the end of this course student should be able to: • Provide respiratory care to all patients in all intensive care units. • Apply the knowledge and skills necessary to provide appropriate interactions with staff, patients, and families of all ages

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Perform arterial puncture and obtain arterial blood gas sample. (P5)
CO2	Perform and explain about the initial ventilator settings and troubleshooting strategies in the common respiratory disorders in adults and neonatal Intensive care units.(P5)
CO3	Perform advanced cardiac life support skills and neonatal resuscitation skill.(P5)
CO4	Interpret and diagnose rhythm abnormalities using electrocardiogram(P4)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		
CO2				x			x	
CO3			x		x			
CO4	x							x

Course Content and Outcomes:

Content	**Competencies**	**Practical hours**
Unit 1:		
Arterial puncture, blood gas analysis and interpretation	• Perform the arterial puncture according to the protocol.(P5) • Perform the arterial line sampling whenever indicated aseptically.(P5) • Perform proper transport precautionary measures for the arterial blood sample.(P5) • Interpret the acid base disorder and the oxygenation status after blood gas analysis.(P2)	04

Content	Competencies	Practical hours
Unit 2:		
Clinical laboratory proficiency	• Identify the normal counts for various laboratory indicators such as white blood cells, Red blood cells and platelets (P3) • Identify the abnormalities in the WBC,RBC and platelet counts (P3) • Assess the haematological results and explain the causes for the haematological abnormalities. (P3) • Identify the normal counts and abnormalities of electrolytes like sodium, potassium, chloride, calcium, magnesium and bicarbonate (P3) • Assess the fluid balance, nutritional status based on laboratory indicators(P5) • Assess the degree of heart, liver, muscle and renal injury based on laboratory indicators(P5)	01
Unit 3:		
Adult ventilator initiation, monitoring and troubleshooting	• Perform initial set up, check and ventilator settings according to the various respiratory disorders.(P5) • Perform ventilator connection on the patient and set appropriate ventilator alarms(P5) • Perform monitoring of ventilator parameters and troubleshoot of any problem occurs.(P5) • Perform initiation and monitoring of non-invasive ventilator support.(P5)	06
Unit 4:		
Advanced cardiac life support and Neonatal resuscitation.	• Perform various predefined algorithms according to the guidelines of Advanced cardiac life support and Neonatal resuscitation.(P5)	06
Unit 5:		
ECG interpretation	• Interpret the normal and abnormal ECG rhythm.(P3) • Identify the abnormal rhythm and recognise the possible cause.(P3) • Document the acquired results in the patient record.(P5)	01
Unit 6:		
Neonatal and pediatric oxygen therapy, ventilator initiation, monitoring and troubleshooting	• Identify the correct neonatal or pediatric oxygen therapy device and assemble it.(P5) • Perform initiation and monitoring of non-invasive ventilator support.(P5) • Perform initial set up, check and ventilator settings according to the various respiratory disorders in neonates and pediatric population (P5) • Perform ventilator connection on the patient and set appropriate ventilator alarms(P5) • Perform monitoring of ventilator parameters and troubleshoot of any problem occurs.(P5)	04

Content	Competencies	Practical hours
Unit 7:		
RT procedures: ET aspirate sampling & Cylinder transport	• Perform ET aspirate sampling as per the indication under aseptic technique(P4) • Perform proper cylinder transport with appropriate selection of cylinder, gas flow and regulator to attach various oxygen therapy devices.(P5)	02

Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic	288	-
Practical	24	72
Revision		
Assessment		-
Total	**312**	

Assessment Methods:				
Formative:	Summative:			
Viva	End Semester Exam (Practical)			
Competency manual				
Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
End Semester Exam	x	x	x	x
Feedback Process:	End-Semester Feedback			

SEMESTER - VI

COURSE CODE	:	COURSE TITLE
RES3201	:	Chronic Respiratory Disease Management
RES3222	:	Mechanical Ventilation - II
RES3231	:	Clinical - IV
RES****		Program Elective - II

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Chronic Respiratory Disease Management**
Course Code	**RES3201**
Academic Year	Third Year
Semester	VI
Number of Credits	3
Course Prerequisite	Student should know the importance of pulmonary rehabilitation in respiratory care.
Course Synopsis	1. The course is designed to familiarize the student with the aspects of pulmonary rehabilitation. 2. The course deals with historical perspective, basic concepts, and family education as a part of pulmonary rehabilitation 3. The student will be taught to train patients in home based rehabilitation, pulmonary rehabilitation for COPD and non-COPD patients

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Define the basic concepts, rationale and components of pulmonary rehabilitation. (C1)
CO2	Explain the mechanism of deconditioning and exercise intolerance in chronic respiratory disease patients.(C2)
CO3	Apply specific strength and endurance exercises and train the patients with chronic respiratory diseases.(C3)
CO4	Develop exercise prescription for patients selected for pulmonary rehabilitation.(C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x					x		
CO2		x		x				
CO3			x		x			
CO4							x	x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1:		
Overview Of Pulmonary Rehabilitation	1. Define pulmonary rehabilitation along with its rationale (C1) 2. Explain the ACCP/AACVPR Evidence-Based Guidelines on Pulmonary Rehabilitation and Integrated Care of the Respiratory Patient(C2) 3. Recall the History of Pulmonary Rehabilitation(C1)	2

Content	Competencies	Number of Hours
Unit 2:		
Selecting and Assessing the Pulmonary Rehabilitation Candidate	1. Select patients for pulmonary rehabilitation with chronic respiratory impairment (C1) 2. Choose the patients with other impairment and conditions for pulmonary rehabilitation(C1) 3. Classify and compare the areas of patient Assessment (C2) 4. Identify the patient goals, plan and set realistic goals(C3)	2 hour (L) 1 hour (T)
Unit 3:		
Exercise Assessment	1. Define the rationale for exercise training in chronic lung disease(C1) 2. Explain the Mechanism of exercise intolerance in chronic respiratory disease(C2) 3. Explain the areas of exercise assessment (C2) 4. Apply Walk Distance Tests (WDTs), Incremental Maximal Exercise Tests (IMETs) and Sub maximal Exercise Test for assessing the exercise tolerance of the patient(C3) 5. List the Exercise Assessment Equipment's (C1) 6. Find the contraindications for cardiopulmonary exercise testing(C1)	2
Exercise training	1. Develop an Exercise Prescription which include mode, frequency, duration and intensity of the exercises based on the exercise assessment done(C3) 2. Demonstrate Resistance Exercise testing, types of resistance modalities, Flexibility, Posture, and Body Mechanics(C2) 3. Show and explain Inspiratory Muscle training(C1,C2) 4. Explain Patient safety, precautions and emergency procedures during the pulmonary rehabilitation program (C2) 5. Explain Home Exercise considerations(C2)	2 hour (L) 2 hour (T)
Unit 4		
Collaborative Self-Management Education	1.Build an individualised self-management program(C3) 2. Explain on the educational areas (C2)	1 hour (L) 2 hour (T)
Unit 5		
Psychosocial assessment and intervention	1.Explain on Psychosocial functioning and assessment(C2) 2.Explain the Interventions to Improve Psychosocial functioning(C2) 3. Summarize the topic on Tobacco Dependence(C2)	2 hour (L) 2 hour (T)
Unit 6		
Patient-Centered Outcomes	1.When to assess and analyzing the outcomes(C1) 2. Classify the common Outcome Measures(C2)	2

Content	Competencies	Number of Hours
Unit 7		
Disease-Specific Approaches in Pulmonary Rehabilitation	1.Explain pulmonary rehabilitation approaches for respiratory disease (C2) a. Asthma b. Cystic Fibrosis c. Interstitial Lung Disease d. Obesity-Related Respiratory Disorders e. Lung cancer	2 hour (L) 1 hour (T)
	2. Explain pulmonary rehabilitation approaches for disease with coexisiting respiratory problems (C2) a. Pulmonary Hypertension b. Chest Wall and Neuromuscular Disorders c. Cardiac disease	2 hour (L) 1 hour (T)
	3.Explain pulmonary rehabilitation approaches on pre and post-surgical patients (C2) a. Lung Volume Reduction Surgery, Lung Transplantation b. Post-surgical patients	2 hour (L) 1 hour (T)
Unit 8		
Program Management	1.Expalin the roles and responsibilities of Interdisciplinary Team, Program Content and Structure(C2) 2. Outline the administrative aspect of program management (C2) 3. Explain the necessity for post rehabilitation maintenance(C2) 4. Explain the strategies for the Program Success(C2)	2 hour (L) 1 hour (T)
Unit 9		
AACVPR Pulmonary rehabilitation Certificate	1.Find how the certification Process is done(C1) 2.Choose the ratio of Staff for training different exercises (C1) 3. Explain how documentation Review is done(C2)	1
Unit 10		
Six Minute walk test and Forms Used	1.Apply American Thoracic Society: Guidelines during 6-Minute Walk Test (C3) 2. Apply different Forms, Questionnaires and Assessments which is used assess the patient and program (C3)	2 hour (L) 1 hour (T)
Unit 11		
Clinical Competency of Pulmonary Rehabilitation Programs	1.Develop the Clinical Competencies required for Pulmonary Rehabilitation Professionals(C3) 2. Find the examples of Pulmonary rehabilitation program that meet 2,3 and 5 days a week and example of a typical pulmonary rehabilitation facility(C1)	2 hour (L) 1 hour (T)

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**39**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam - Theory
Quiz	End Semester Exam – Theory
Assignments/Presentations	

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester / Sessional Examination 1	x	x		
Quiz / Viva	x	x	x	x
Assignments/Presentations		x	x	
End Semester Exam	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	• Author(s): AACVPR Guidelines for Pulmonary Rehabilitation Programs Edition: Fifth ISBN-13: 978-1492550914 • Author: John Hodgkin; Pulmonary rehabilitation Guidelines to Success, Edition: Fourth ISBN: 9780323062749
Additional References	• Author: Enrico Clini; Textbook of Pulmonary Rehabilitation: ISBN 978-3-319-65888-9

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	Mechanical Ventilation II
Course Code	**RES3222**
Academic Year	**Third Year**
Semester	VI
Number of Credits	4
Course Prerequisite	Student should have the knowledge on different modes of ventilation, how to set it as per the patients clinical condition, ventilator patient monitoring, basic ventilator management and troubleshooting.
Course Synopsis	1. This subject will help to understand various pulmonary and extrapulmonary effects and complications associated with the initiation of mechanical ventilation 2. To familiarize troubleshooting, use of non-invasive ventilation strategies and weaning in ventilated patients 3. To understand and apply the use of newer ventilation modalities in the critically ill patients

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Define various terminologies used in newer mechanical ventilation strategies (C1.P1)
CO2	Explain the various effects and complications associated with mechanical ventilation (C2,P2)
CO3	Apply the various troubleshooting strategies after analyzing the problem practically (C3,P3)
CO4	Plan and demonstrate various mechanical ventilation skills in terms of weaning and use of non-invasive ventilation in the ICU(C3,P3)
CO5	Explain the use of special ventilation modalities in the critically ill patients (C2,P2)
CO6	Apply the practical skills of various newer ventilation modalities in the laboratory and clinical setup (C3,P3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2				x	x			
CO3		x	x					
CO4		x				x		
CO5	x				x			
CO6							x	x

Course Content and Outcomes:

Content	**Competencies**	**Number of Hours**
Unit 1: Effects and Complications of Mechanical ventilation		
Ventilator associated	1. Define ventilator associated pneumonia (C1.P1) 2. List the causes and risk factors (C1.P1)	1 hour (L) 2 hour (P)

Content	Competencies	Number of Hours
pneumonia	3. Explain the pathophysiology and diagnostic criteria of ventilator associated pneumonia (C2,P2) 4. Explain the pharmacologic and non-pharmacologic management of ventilator associated pneumonia (C2,P2) 5. Explain VAP bundle use in the ICU (C2,P2)	
Sedatives, Analgesic and Paralytics	1. List the indications for the use of sedatives, analgesics and paralytics in the ICU (C1.P1) 2. Classify with the drugs and explain the mechanism of action (C2,P2) 3. Recall and understand the dosage for each medication (C1.P1) 4. List the adverse drug reactions for each class of sedatives, analgesic and paralytics (C1.P1)	1 hour (L) 2 hour (P)
Extra pulmonary Effects of Mechanical Ventilation	1. Explain the differences in cardiopulmonary changes during spontaneous and negative pressure ventilation (C2,P2) 2. Explain in detail the beneficial and adverse effects of PPV on heart and thoracic vessels (C2,P2) 3. Explain in detail the beneficial and adverse effects of PPV on renal, gastrointestinal and intracranial system(C2,P2) 4. Explain the different steps to minimize these adverse effects of PPV (C2,P2)	2 hour (L) 4 hour (P)
Effects of Positive Pressure Ventilation on the Pulmonary System	1. List the different adverse effects of PPV on pulmonary system (C1.P1) 2. Explain different ventilator associated and ventilator induced lung injuries during PPV (C2,P2) 3. Summarizing other pulmonary effects of MV on acid-base disturbances, air trapping, oxygen toxicity, and ventilator muscle load (C2,P2) 4. Explain the methods to minimize all the pulmonary effects associated with mechanical ventilation (C2,P2)	2 hour (L) 4 hour (P)
Troubleshooting and Problem Solving	1. Define the terms problem and solving (C1.P1) 2. Explain the process of identifying, protecting and managing a patient on sudden distress (C2,P2) 3. List the different patient related and ventilator related problems (C1.P1) 4. Explain in detail the causes for different ventilator and patient related problems (C2,P2) 5. Explain the process of identifying and troubleshooting each problem with the help of ventilator graphics and alarm situations (C2,P2) 6. Apply these trouble shooting skills practically in laboratory and clinical setup (C3,P3)	2 hour (L) 4 hour (P)
Unit 2: Non-invasive Positive Pressure Ventilation		
Basic concepts of non invasive	1. Define NIPPV (C1.P1) 2. List the indications, goals, contraindications and	2 hour (L) 4 hour (P)

Content	Competencies	Number of Hours
positive pressure ventilation (NIPPV)	complications for using NIPPV (C1.P1) 3. Explain the clinical benefits of NIPPV in different disease conditions (C2,P2) 4. Explain the selection criteria for NIV (C2,P2) 5. Explain in detail on equipment selection, setup and preparation, and monitoring and weaning from NIPPV (C2,P2) 6. List the criteria for patient disconnection from NIPPV (C1.P1) 7. Apply the use and technique of NIPPV in the laboratory and clinical setup (C3,P3)	
Unit 3: Discontinuation from Ventilation		
Weaning techniques and evidence based weaning	1. Define weaning (C1.P1) 2. List the different weaning techniques (C1.P1) 3. Explain the methods of titrating ventilator support during weaning(Traditional and closed loop ventilation weaning) (C2,P2) 4. List the evidence based weaning components(C1.P1) 5. Explain briefly all the components of evidence based weaning (C2,P2) 6. Explain the weaning criteria and weaning indices (C2,P2) 7. Apply the use and technique of Weaning in the laboratory and clinical setup (C3,P3)	2 hour (L) 4 hour (P)
Factors in weaning failure and final recommendation in weaning	1. Define SBT failure and weaning failure 2. Explain the respiratory and non-respiratory factors for weaning.(C2,P2) 3. Explain the therapist driven protocols for weaning and role of tracheotomy in weaning.(C2,P2)	2 hour (L) 4 hour (P)
Unit 4: Long term mechanical ventilation		
Long term mechanical ventilation	7. List the goals for long term mechanical ventilation (C1.P1) 8. Explain the sites, patient selection, equipment selection, follow up and evaluation of patients on long term mechanical ventilation(C2,P2) 9. List the conditions appropriate for long term mechanical ventilation (C1.P1) 10. List the complications for long term mechanical ventilation (C2,P2) 11. Explain the different equipment available for supporting patients in long term mechanical ventilation (C2,P2) 12. Explain in details use of long term oxygen therapy in chronic respiratory failure patients (C2,P2) 13. Apply the use of long term mechanical ventilation equipment in the laboratory and clinical setup (C3,P3)	2 hour (L) 4 hour (P)

Content	Competencies	Number of Hours
Unit 5: Special Applications in Ventilator Support		
Airway pressure release ventilation (APRV)	1. Define APRV (C1.P1) 2. List the indications, advantages, dis advantages and complications (C1.P1) 3. Explain the initiation, monitoring and weaning from APRV mode (C2,P2) 4. Apply the use of APRV mode in the laboratory and clinical setup (C3,P3)	2 hour (L) 4 hour (P)
High Frequency Oscillatory Ventilation (HFOV) in the Adults	5. Define HFOV (C1.P1) 6. Explain briefly the types of high frequency ventilation (C2,P2) 7. Explain the principles of HFOV (C2,P2) 8. List the indication, contraindications, advantages and complications of HFOV (C1.P1) 9. Explain the initial control settings, adjustment based on the oxygenation and ventilation, and weaning from HFOV (C2,P2)	2 hour (L) 4 hour (P)
Heliox Therapy and Mechanical Ventilation	1. List the properties of helium and oxygen (C1.P1) 2. Explain the principle of gas flow through the airways (C2,P2) 3. List the indications, advantages and complications of Heliox therapy (C1.P1) 4. Explain the use of heliox in different clinical conditions (C2,P2) 5. Explain the use of interface, initiation, monitoring and weaning from heliox (C2,P2) 6. Explain the use of heliox with different interfaces(C2,P2)	2 hour (L) 4 hour (P)
Neurally adjusted ventilator assist (NAVA)	1. Define NAVA(C1.P1) 2. Explain the different terminologies used in NAVA (C2,P2) 3. Explain the normal neural signal transfer to the respiratory muscles (C2,P2) 4. List the indications, advantages and complications of using NAVA (C1.P1) 5. Explain the different equipments used to set up NAVA (C2,P2) 6. Explain the initiation, monitoring and weaning from NAVA (C2,P2)	2 hour (L) 4 hour (P)
Ventilation perfusion mismatch	1. Define the different terminologies (C1.P1) 2. List the causes for ventilation perfusion mismatch (C1.P1) 3. Explain normal ventilation perfusion matching in pulmonary system (C2,P2) 4. Explain ventilation perfusion mismatch in different disease conditions (C2,P2) 5. Explain the ways to minimize ventilation perfusion mismatch (C2,P2)	1 hour (L) 2 hour (P)
Physiological dead space	1. Define the term deadspace (C1.P1) 2. Explain the causes for increased dead space (C2,P2)	1 hour (L) 2 hour (P)

Content	Competencies	Number of Hours
	3. Explain the methods to monitor dead space in ventilated patients (C2,P2) 4. Explain the methods to minimize deadspace (C2,P2)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	78
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical	52	-
Revision		
Assessment		-
Total	**78**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory and/or Practical)
Quiz	End Semester Exam (Theory)
Viva	
Assignments	

Mapping of Assessment with COs:						
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Mid Semester / Sessional Examination 1	x	x	x	x		
Quiz / Viva	x	x	x	x	x	x
Assignments				x	x	x
End Semester Exam	x	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	J.M. Cario Pilbeam‘s Mechanical Ventilation: Physiological and Clinical Applications Edition: Fifth Print ISBN: 978-0-323-09617-1 Electronic ISBN: 978-0-323-29209-2
Additional References	Egans Fundamentals of Respiratory Care ,10th edition; *ISBN* 9780323511124

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Clinical - IV**
Course code	**RES3231**
Academic Year	Third Year
Semester	VI
Number of Credits	10
Course Prerequisite	The student should have a basic theoretical knowledge on these topic and basic competency skills.
Course Synopsis	At the end of this course student should be able to: • Provide respiratory care to all patients in all intensive care units. • Apply the knowledge and skills necessary to provide appropriate interactions with staff, patients, and families of all ages.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Perform infection control practices (P5)
CO2	Recognize and perform the respiratory care & related diagnostic procedures as per the patient requirement(P5)
CO3	Take part in bedside weaning assessment and extubation (P4)
CO4	Outline and execute appropriate ventilator strategy based on various respiratory disorders(P6)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		
CO2			x				x	
CO3				x	x			
CO4	x							x

Course Content and Outcomes:

Content	**Competencies**	**Practical Hours**
Unit 1:		
Acapella	1. Explain the purpose of the procedure(C2) 2. Perform proper patient positioning (P4) 3. Organize and assemble the equipment's (P3) 4. Demonstrate and explain how to perform the procedure(P2) 5. Perform proper documentation of the patient during the procedure (P4)	4 hours
Unit 2:		
Inspiratory muscle trainer	1. Explain the purpose of the procedure(C2) 2. Perform proper patient positioning (P4)	4 hours

Content	Competencies	Practical Hours
	3. Organize and assemble the equipment's (P3) 4. Demonstrate and explain how to perform the procedure(P2) 5. Perform proper documentation of the patient during the procedure (P4)	
Unit 3:		
Chest vest therapy/ Intrapulmonary percussive ventilation	1. Explain the purpose of the procedure(C2) 2. Perform proper patient positioning (P4) 3. Organize and assemble the equipment's (P3) 4. Demonstrate and explain how to perform the procedure(P2) 5. Perform proper documentation of the patient during the procedure (P4)	4 hours
Unit 4:		
Non-invasive ventilation	1. Organize and assemble the equipment's as per the patient requirement (P3) 2. Explain the purpose of the procedure to the patient(P2) 3. Perform the initiation of non-invasive ventilation with appropriate settings(P5) 4. Perform patient monitoring during and after the initiation of procedure (P4) 5. Perform proper documentation of the patient during the procedure (P4)	4 hours
Unit 5:		
Bedside weaning assessment	1. Perform order verification(P3) 2. Determine if patient is ready to wean(P5) 3. Explain the purpose of the procedure to the patient(P2) 4. Perform proper positioning and preparation of the patient (P4) 5. Organize and assemble the equipment's (P3) 6. Explain the patient to breath spontaneously(P2) 7. Measure the parameters that determine readiness to extubation (P5) 8. Perform proper documentation and monitoring of the patient(P4)	4 hours
Unit 6:		
Extubation	1. Perform order verification(P3) 2. Determine if patient meets the criteria for extubation (P5) 3. Organize and assemble the equipment's (P3) 4. Explain the procedure to the patient(P2) 5. Perform proper positioning and preparation of the patient (P4) 6. Perform the procedure and instruct the patient to communicate if they have any problem(P5) 7. Perform proper documentation and monitoring of the patient(P4)	5 hours

Content	Competencies	Practical Hours
Unit 7:		
Case based learning	1. Find the patient diagnosis based on the patient history and presenting condition(P1) 2. Determine the management strategy as per the clinical condition in terms of general, definitive and supportive measures(P5) 3. Decide appropriate ventilator strategy and troubleshoot and problems associated with the ventilation(P6)	5 hours

Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture		
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic	360	
Practical	30	90
Revision		
Assessment		
Total	**390**	**90**
Assessment Methods:		
Formative:	Summative:	
Viva	End Semester Exam (Practical)	
Competency manual		

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
End Semester Exam	x	x	x	x
Feedback Process:	End-Semester Feedback			

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**End of Life Issues and Bioethics**
Course Code	**RES3243**
Academic Year	Third Year
Semester	VI
Number of Credits	3
Course Prerequisite	Student should have a fundamental knowledge on laws and ethics associated with medical field.
Course Synopsis	1. This course is an introduction to the ethical principles governing patient care and work 2. To provide the fundamental knowledge of laws governing the health professionals 3. To understand the end of life issues faced by a respiratory therapist 4. To familiarize students with clinical scenarios that involve ethical decision-making.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Explain the key concept of ethics (C2)
CO2	Explain the clinician-patient relationship (C1)
CO3	Explain the end of life issues, neonatal issues and parental decision making(C2)
CO4	Identify the situation which can result in ethical issue and solve the problem ethically(C3)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	x						x	
CO2		x			x			
CO3			x			x		
CO4				x				x

Course Content and Outcomes:

Content	**Competencies**	**Number of hours**
Unit 1:		
How to approach any patient for ethical problem solving	1. Identify the medical condition (C3) 2. Interview the patient for their preferences (C3) 3. Explain the patient quality of life in patient's terms (C1) 4. Identify the contextual features that can influence the decision (C3)	2 hour (L) 1 hour (T)
Unit 2:		
Confidentiality	1. What does the duty of confidentiality come from (C1) 2. What does the duty of confidentiality require(C1)	2 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	3. Identify what kind of disclosure are inappropriate (C3) 4. Identify the situation where confidentiality can be breached (C3)	
Unit 3:		
Doctor - patient relationship	1. Explain the fiduciary relationship(C2) 2. List the factors which can affect physician-patient communication(C1) 3. Explain the situation when physician and patient disagree (C2) 4. Explain the role of confidentiality(C2)	2
Unit 4:		
Breaking bad news	1. Plan how to get started for breaking bad news(C3) 2. Find how much the patient knows(C1) 3. Find how much the patient wants to know (C1) 4. Plan how to share the information (C3) 5. Identify and respond to the patients feeling(C3) 6. Outline the plan and follow through(C2)	1 hour (L) 1 hour (T)
Unit 5:		
The major principle of medical ethics	1. Explain the respect for autonomy(C2) 2. Explain the principle of Non- maleficence(C2) 3. Explain the principle of Beneficence(C2) 4. Explain the principle of Justice (C2)	2 -
Unit 6:		
Ethical issues associated with AIDS	1. What is the legal decision making status of a long term partner (C1) 2. Identify the staff members who may be able to help (C3) 3. How to deal with prejudices associated with this case(C1)	1 hour (T)
Unit 7:		
Do not resuscitate orders	1. When should CPR be administered (C1) 2. When can CPR be withheld(C1) 3. Identify the scenarios where CPR is not benefiting (C3) 4. How should the patient's quality of life be considered(C1) 5. Identify the situations were DNR orders can be given(C3) 6. Explain the two general approach if the patient is unable to express their wish(C2)	2 -
Unit 8:		
Informed Consent	1. What is informed consent(C1) 2. List the elements of full informed consent(C1) 3. List the intervention which requires informed consent(C1) 4. Identify the situation appropriate to question a	2 hour (L) 1 hour (T)

Content	Competencies	Number of hours
	patient's ability to participate in decision making(C3) 5. Explain implied consent(C2)	
Unit 9:		
Ethical issues related to mistakes	1. Explain the ethical duty to disclose information about medical mistakes to their parents (C2) 2. What is the risk associated with disclosing information about the mistake(C1) 3. What are the steps to be taken if you find someone else making a step(C1)	1 -
Unit 10:		
Termination of life-sustaining treatment	1. Outline the situations to discontinue life-sustaining treatment and identify the situation when treatment is no longer "of benefit" (C2) 2. Outline the steps to do if the patient is not competent(C2) 3. Explain the general approach for a patient who is not competent (C2) 4. Identify the factors that affect the withhold or withdraw of care(C3)	2 -
Unit 11:		
End of Life Issues	1. What is good death (C1) 2. Explain the goals when working towards a decent death for a patient (C2) 3. Outline the need to understand the care of a dying patient(C2) 4. How a physician can deal with their feelings of a dying patient(C1)	2 hour (L) 1 hour (T)
Unit 12:		
Truth-telling and withholding the information	1. Explain how much details should be told to the patient(C2) 2. Outline the situation to withhold the truth from the patent(C2) 3. What should be done if the truth is harmful (C1) 4. Explain if it's justifiable to deceive a patient with placebo(C2)	1 hour (L) 1 hour (T)
Unit 13:		
Ethics committees and ethics Consultation	1. List the goals of an ethics committee(C1) 2. List the members of an ethics committee(C1) 3. Explain the circumstances under which the ethics committee needs to be used (C2)	2 hour (L) 1 hour (T)
Unit 14:		
Professionalism	1. What are the marks of the profession (C1) 2. What is the difference between a profession and a business (C1) 3. What are the recognized obligations and values of a professional physician (C1)	1

Content	Competencies	Number of hours
Unit 15:		
Public Health Ethics, research ethics & undergraduate medical student and ethics	1. List the condition under which disease needs to be reported to public health authorities(C1) 2. Explain if a patient can refuse to undergo routine public health measure or a physician can refuse to follow public health mandates which he opposes (C2) 3. Outline when can a patient be held for medical treatment against his will(C2) 4. Explain the ethical issues in human subjects research(C2) 5. List the components of an ethically valid inform consent(C1) 6. What are the steps to do if you find any resident or doctors doing something unethical(C1)	1 hour (L) 1 hour (T)
Unit 16:		
Resource allocation	1. Explain the rules guide rationing decision(C2) 2. Identify the ethical criteria for making triage decision(C3) 3. Outline the allocation decision based on a judgement about “quality of life”.(C2)	1 hour (T)
Unit 17:		
Medical malpractice	1. Explain malpractice law and patient safety(C2) 2. Explain what are the new development occurring in the Indian context (C2)	1 hour (L) 1 hour (T)
Unit 18:		
Sex selection	1. Explain the ethical issues related to sex selection(C2**)**	**1 hour (T)**
Unit 19:		
Stem cell transplant, surrogate motherhood	1. What is stem cell transplant (C1) 2. Explain the ethical issues related to stem cell transplant (C2) 3. What is surrogacy and types of surrogacy (C1) 4. Identify who can be a surrogate(C3) 5. Explain the ethical issues related to surrogacy(C2)	1 hour (T)
Unit 20:		
Neonatal issues and Parental decision making	1. Explain the accepted legal and ethical basis for decision making regarding the nature of medical care in the newborn (C2) 2. How to predict which category of neonate will not survive without aggressive management(C1) 3. Who is the decision-maker regarding the nature of medical care administered to a newborn infant(C1) 4. Identify who has the authority to decide for children(C3) 5. Identify the basis for granting medical decision-	2 -

Content	Competencies	Number of hours
	making authority to parents(C3) 6. Explain the situation when parent's authority to make decisions for their children become challenged(C2) 7. Identify the circumstances when a minor can take the medical decision for themselves(C3)	

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	26	52
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)	13	26
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		
Total	**39**	**78**

Assessment Methods:	
Formative:	**Summative:**
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
Viva	
Assignments/Presentations	

Mapping of Assessment with COs:				
Nature of Assessment	**CO1**	**CO2**	**CO3**	**CO4**
Mid Semester / Sessional Examination 1	x	x	-	-
Quiz / Viva	x	x	x	x
Assignments	x	x	x	x
End semester Examination	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	1. A P Jain, Fundamentals Issues In Bio-Medical Ethics
Additional References	2. Jacqulyn K Hall Law & Ethics for Clinicians ISBN:1-888856-00-9

Manipal College of Health Professions	
Name of the Department	Respiratory therapy
Name of the Program	Bachelor of Science in Respiratory therapy
Course Title	**Registry Review**
Course Code	**RES3244**
Academic Year	Third Year
Semester	VI
Number of Credits	3
Course Prerequisite	Student should have knowledge on all the aspects of respiratory system, respiratory disease and its management.
Course Synopsis	This module helps the student in • Preparation for competitive exams after graduation. • Understanding basics and advanced concepts of respiratory care.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Build themselves for the international board examination (C3)
CO2	Demonstrate the use of different respiratory therapy devices (C2)
CO3	Take part in obtaining laboratory test, imagining test, blood samples(C4)
CO4	Construct a respiratory care protocol for the patient (C3)
CO5	Interpret the reports of different test(C5)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1	×	×						
CO2					×	×		
CO3			×	×				
CO4							×	×
CO5			×			×		

Course Content and Outcomes:

Content	**Competencies**	**Number of lecture hours**
Patient assessment and care management	1. Explain in the physical examination of a patient – inspection, palpation, percussion and auscultation (C2) 2. Explain the neonatal and paediatric assessment (C2) 3. Identify the patients subjective and objective response to respiratory care(C3) 4. Interpret the radiographic imaging of the patient (C2)	2
Infection control	1. Explain the different procedure of infection control (C2) 2. Identify the different universal precaution equipment.(C3) 3. List the different recommended vaccinations available.(C1)	2

Content	Competencies	Number of lecture hours
	4. Demonstrate the methods used to decontaminate the respiratory care equipment.(C2) 5. Identify the different biohazard materials and its disposal unit.(C3)	
Blood gas sampling, analysis, monitoring and interpretation	1. List the conditions that requires blood gas analysis(C1) 2. Explain the procedure for obtaining an arterial blood sample.(C2) 3. Explain the different devices used for blood gas sampling.(C2) 4. Analyse the arterial blood sample(C4) 5. Interpret the blood gas analysis report(C5) 6. Develop a respiratory care plan for the patient.(C3)	2
Pulmonary function test (PFT)	1. Identify the disease conditions that requires PFT.(C3) 2. Explain the normal spirometry(C2) 3. Explain the different advanced pulmonary function tests(C2) 4. Demonstrate the pulmonary function testing device and equipment.(C2) 5. Develop a respiratory care plan for the patient.(C3)	2
Advanced cardiopulmonary monitoring	1. Explain the different methods of monitoring exhaled carbon dioxide.(C2) 2. Explain the different ways to monitor the hemodynamic parameters.(C2) 3. Take part in the device used for carbon dioxide and hemodynamic monitoring.(C4) 4. Demonstrate the use of cardiopulmonary monitoring equipment.(C2) 5. Develop a respiratory care plan for the patient(C3)	2
Oxygen therapy and medical gas therapy	1. List the indications for oxygen therapy(C1) 2. Explain the harmful effects of oxygen therapy(C2) 3. Explain in detail about the oxygen cylinders(C2) 4. Explain the different types of oxygen delivery device.(C2) 5. Demonstrate the use of different device of oxygen therapy(C2) 6. Explain in detail the other medical gas delivery therapy(C2)	2
Hyperinflation therapy	1. List the indications and contraindications for hyperinflation therapy(C1) 2. Demonstrate the procedure of deep breathing exercise, inspiratory muscle training (C2) 3. List the indications, contraindications for incentive spirometer.(C1) 4. Demonstrate the two types of incentive spirometer equipment.(C2) 5. Develop a respiratory care plan(C3)	2
Humidity and aerosol therapy	1. List and explain the indications and contraindications for humidity and aerosol	2

Content	Competencies	Number of lecture hours
	therapy(C1,C2) 2. Demonstrate the different classification of humidity delivery devices(C2) 3. Demonstrate the different types of aerosol therapy devices/systems(C2) 4. Explain the different environmental control devices(C2) 5. Demonstrate the different breathing exercise for medication delivery(C2) 6. Develop a respiratory care plan for the patient(C3)	
Pharmacology	1. List the different routes of drug administration.(C1) 2. Explain the mechanism of action of different classification of medication.(C2) 3. List the different classification of bronchodilators with examples.(C1) 4. List the different classification of anti-inflammatory agents with examples.(C1) 5. List the different mucolytic agents with examples.(C1) 6. List the diuretic agents, sedatives, analgeics, neuromuscular blocking agents with examples each(C1) 7. List the different classification of antimicrobial agents with examples.(C1) 8. Explain the calculation of drug dosage for each classification(C2) 9. Develop a respiratory care plan for the patient(C3)	2
Airway clearance therapy	1. Define bronchial hygiene therapy (BHT)(C1) 2. List the indication, contraindication and complication of bronchial hygiene therapy.(C1) 3. Demonstrate the steps to perform of different BHT methods.(C2) 4. List the different device used for BHT(C1) 5. Explain the steps to use the different BHT devices(C2) 6. Develop a respiratory care plan for the patient(C3)	2
Cardiac monitoring and cardiopulmonary resuscitation	1. Outline and explain the algorithm of basic life support for adult, paediatric and neonate(C2) 2. Explain the equipment used for cardiopulmonary resuscitation(C2) 3. Explain the steps of chest compression and manual ventilation for adult and neonate(C2) 4. Explain the standard 12 lead ECG(C2) 5. Interpret the different arrhythmias(C5) 6. Recommend the different ACLS protocol agents for different condition(C5) 7. Develop a respiratory care plan for the patient(C3)	3
Airway management	1. Explain the different types of oropharyngeal airways(C2) 2. Explain the different types of nasopharyngeal airway(C2)	2

Content	Competencies	Number of lecture hours
	3. Explain the different types of blind insertion airway devices(C2) 4. Explain the different types of tracheostomy devices(C2) 5. Explain in brief about the speaking tubes and valves(C2) 6. Demonstrate the steps for insertion of different devices(C2) 7. Explain the endotracheal tube and intubation equipment(C2) 8. Demonstrate the steps of intubation(C2) 9. Demonstrate the steps of endotracheal extubation(C2) 10. Develop a respiratory care plan.(C3)	
Suctioning the airway	1. Explain the oropharyngeal suction devices(C2) 2. Demonstrate the steps to use and troubleshot the suction devices(C2) 3. Explain the vacuum regulator systems(C2) 4. Demonstrate the steps to perform tracheal suctioning(C2) 5. List the indications, contraindication and complications of suctioning(C1) 6. Develop a respiratory care plan for the patient(C3)	2
Intermittent positive pressure breathing (IPPB)	1. Demonstrate the initial adjustments of IPPB for respiratory support(C2) 2. List the indications, contraindications, complications/hazards of IPPB(C1) 3. Explain the steps to set the initial parameters of IPPB(C2) 4. Demonstrate the steps to use the IPPB device(C2) 5. Develop a respiratory care plan for the patient(C3)	2
Mechanical ventilation of the adult	1. List the indications for initiating mechanical ventilation(C1) 2. Illustrate the steps to provide mechanical ventilation support based on the clinical condition(C2) 3. Explain the different conventional modes of mechanical ventilation(C2) 4. Explain the various unconventional modes of mechanical ventilation(C2) 5. Demonstrate the use of different mechanical ventilation equipment(C2) 6. Evaluate the patients response to mechanical ventilation(C5) 7. Recommend modifications in mechanical ventilation based on the patients response(C5) 8. Explain the criteria for weaning and extubation from mechanical ventilation(C2) 9. Develop a respiratory care plan for the patient(C3)	3

Content	Competencies	Number of lecture hours
Mechanical ventilation of the neonate	1. List the indications for initiating mechanical ventilation (C1) 2. Illustrate the steps to provide mechanical ventilation support based on the clinical condition(C2) 3. Explain the different modes of mechanical ventilation(C2) 4. Demonstrate the use of different mechanical ventilation equipment(C2) 5. Evaluate the patients response to mechanical ventilation(C5) 6. Recommend modifications in mechanical ventilation based on the patients response(C5) 7. Explain the criteria for weaning and extubation from mechanical ventilation(C2) 8. Develop a respiratory care plan for the patient(C3)	2
Home care and pulmonary rehabilitation	1. Assess the patients learning needs(C5) 2. Develop a rehabilitation therapy for patient based on clinical condition(C3) 3. Explain the various home respiratory care services(C2) 4. Develop a pulmonary rehabilitation plan for the patient(C3) 5. Explain the various exercise for strength and endurance(C2) 6. Develop a respiratory care for the patient. (C3)	2
Special procedures	1. Explain the following procedures: (C2) a. Seldinger technique b. Cardioversion c. Bronchoscopy d. Thoracocentesis e. Pericardiocentesis f. Intubation g. Tracheostomy 2. List the indication, contraindication and complications of the above mentioned procedure(C1) 3. Demonstrate the steps to perform the following procedure(C2) 4. Explain the equipment used for the following procedures(C2) 5. Explain about cardiopulmonary sleep study(C2) 6. Explain the different types of sleep disordered breathing(C2) 7. Explain polysomnography(C2) 8. Develop a respiratory care plan(C3)	3

Learning Strategies, Contact Hours and Student Learning Time (SLT):		
Learning Strategies	**Contact Hours**	**Student Learning Time (SLT)**
Lecture	39	78
Seminar		
Small group discussion (SGD)		
Self-directed learning (SDL)		
Problem Based Learning (PBL)		
Case Based Learning (CBL)		
Clinic		
Practical		
Revision		
Assessment		-
Total	**39**	**78**

Assessment Methods:	
Formative:	Summative:
Unit Test	Mid Semester/Sessional Exam (Theory)
Quiz	End Semester Exam (Theory)
	-
Assignments/Presentations	

Mapping of Assessment with COs:					
Nature of Assessment	CO1	CO2	CO3	CO4	CO5
Mid Semester / Sessional Examination 1	x	x	x		
Quiz		x	x	x	
Assignments	x		x	x	x
End Semester Exam	x	x	x	x	x

Feedback Process:	Mid-Semester Feedback
	End-Semester Feedback
Main Reference:	James R Sills. The Comprehensive Respiratory Therapist Exam Review, 5th Edition. ISBN-13: 978-0323067010
Additional References	Gary Persing, Respiratory Care Exam Review, 5th Edition, **ISBN:** 9780323553681

SEMESTER VII &VIII

(INTERNSHIP)

Manipal College of Health Professions	
Name of the Department	Department of Respiratory Therapy
Name of the Program	Bachelor of Science in Respiratory Therapy
Course Title	**Internship**
Academic Year	**Fourth Year**
Semester	VII , VIII semester (Duration: 1 year)
Number of Credits	---
Course Prerequisite	• Student should have certification in ACLS, BLS, and NRP. • Basic knowledge of respiratory physiology across age • Basic knowledge of Respiratory care procedure including mechanical ventilation and trouble shooting
Course Synopsis	At the end of this course student should be able to: • Provide respiratory care to all patients in all intensive care units. • Apply the knowledge and skills necessary to provide appropriate interactions with staff, patients, and families of all ages.

Course Outcomes (COs): **At the end of the course student shall be able to:**	
CO1	Perform infection control practices (P5)
CO2	Perform the initial assessment in terms of obtaining vitals, history taking and physical examination(P4)
CO3	Recognize and perform the respiratory care & related diagnostic procedures as per the patient requirement(P5)
CO4	Take part in airway management procedures(P4)
CO5	Outline and execute appropriate ventilator strategy based on various respiratory disorders(P6)
CO6	Apply the knowledge and develop the appropriate treatment plan and ventilator strategy as per the disease state(P6)

Mapping of Course Outcomes (COs) to Program Outcomes (POs):

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
CO1		x				x		
CO2	x			x				
CO3			x				x	
CO4		x			x			
CO5				x		x		
CO6	x							x

Course Content and Outcomes:

Content	**Competencies**
Unit 1: Infection control practices	1. Perform hand washing (P5) 2. Perform universal precaution (P5)
Unit 2: Initial assessment	1. Identify the abnormalities in vital signs(P3) 2. Interview the patient to obtain their disease history(P3) 3. Demonstrate the physical examination (P5)

Content	Competencies
Unit 3: Patient monitoring	1. Make use of pulse oximetry and capnography for patient monitoring(P3) 2. Interpretation of ECG (P6)
Unit 4: Respiratory care procedures	1. Choose and administer oxygen therapy device as per the patient requirement(P6) 2. Choose and administer aerosol therapy (P6) 3. Choose and administer appropriate humidification therapy(P6) 4. Perform bronchial hygiene therapy (P6)
Unit 5: Diagnostic procedures	1. Perform a pulmonary function test and interpret the report. (P4) 2. Perform arterial blood gas analysis and interpret the report(P4) 3. Decide the required measures to rectify any ABG abnormality(P6) 4. Interpret the chest radiography abnormality(P2) 5. Perform ET aspirate sampling(P4) 6. Interpret any abnormalities in a clinical lab report (P2)
Unit 6: Lung expansion therapy	1. Explain the proper usage of incentive spirometry, acapella, inspiratory muscle trainer, insufflator /exsufflator to patients(P1) 2. Motivate the patients to perform lung expansion therapy properly as indicated (P4)
Unit 7: Airway management	1. Determine the need for airway management and take part in airway management of patients who require intubation or insertion of any airway adjunct (P6) 2. Test for any endotracheal tube leak and airway cuff pressure management (P4) 3. Determine the need for airway clearance and take part in it(P5)
Unit 8: Neonatal and adult ventilator management	1. Perform adult ventilator initiation and monitoring(P6) 2. Determine adult ventilator troubleshooting(P5) 3. Determine and perform neonatal/pediatric oxygen therapy(P5) 4. Perform Infant ventilator set up(P6) 5. Determine Neonatal/pediatric ventilator monitoring and troubleshooting(P5) 6. Test for the proper function of neopuff and perform resuscitation(P4) 7. Determine bedside weaning assessment (P5) 8. Determine and perform extubation (P5)
Unit 9: Case-based learning	1. Find the patient diagnosis based on the patient history and presenting condition(P1) 2. Determine the management strategy as per the clinical condition in terms of general, definitive and supportive measures(P5) 3. Decide appropriate ventilator strategy and troubleshoot and problems associated with the ventilation(P6)

Content	Competencies
Unit 10: Problem- based learning	1. Decide appropriate troubleshooting for problems associated with ventilation (P6) 2. Justify and perform appropriate intervention to rectify the ventilator-associated problems(P6)
Learning Strategies: Problem Based Learning (PBL), Case Based Learning (CBL), Clinics. **Formative Assessment: Clinical Log Book**	

7. Program Outcomes (POs) and Course Outcomes (COs) Mapping

Semester	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
I	ANA1101	Anatomy - I	03	CO1 CO2	-	-	-	-	-	-	-
I	ANA1112	Anatomy practical - I	02	-	CO1 CO2	-	-	-	-	-	-
I	PHYS101	Physiology - I	02	CO1 CO2 CO3 CO4	-	-	-	-	-	-	-
I	YGA1121	YOGA	2	CO1	CO4	CO2	CO3	CO2	CO1	CO3	CO4
I	EIC1001	Environmental Sciences	1	CO1 CO2 CO3	-	CO4 CO5	CO2		CO1 CO3 CO5 CO5	CO4	
		Indian constitution	1	CO1		CO3	CO2 CO5	CO2	CO4	CO1 CO3 CO5	CO4
I	CSK1001	Communication skills	2	-	CO3	CO4	-	CO1 CO2	-	CO1 CO2 CO3 CO4	-
I	RES1101	Clinical Anatomy and Physiology of Respiratory Care	04	CO1	CO3	CO1	CO2	CO3	CO2	CO4	CO4
I	RES1102	Medical Terminology	03	CO1	CO1	CO2	CO4	CO2	CO3	CO4	CO3
II.	ANA1201	Anatomy - II	2	CO1	-	-	-	-	-	-	-
II.	ANAT104	Anatomy practical - II	2	-	CO1	-	-	-	-	-	-
II.	PHY1101	Physiology - II	2	CO1 CO2 CO3 CO4	-	-	-	-	-	-	-
II.	BIC1201	Biochemistry	3	CO1 CO2 CO3 CO4	-	-	-	-	-	-	-
II.	RES1201	Clinical Examination in Respiratory Care	4	CO1 CO4	CO1 CO2	CO4	CO3	CO3	CO2 CO6	CO5	CO5 CP6
II.	RES1202	Respiratory care Equipment	4	CO1	CO3	CO3	CO2	CO2	CO4	CO4	CO1
II.	RES1223	Pulmonary Diagnostic - I	3	CO1 CO6	CO2 CO4	CO5	CO3	CO3	CO4 CO6	CO2	CO5

Semester	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
III.	MCB2103	Microbiology	3	CO1 CO2 CO3 CO4	-	-	-	-	-	-	-
III.	PAT2103	Pathology	3	CO1 CO2 CO3 CO4	CO3 CO4	-	-	-	-	-	-
III.	RES2101	Pulmonary Diagnostic - II	2	CO1	CO2 CO3	CO3	CO2	CO5	CO1 CO6	CO5 CO6	CO4 CO5
III.	RES2102	Pediatric Respiratory Care	3	CO1	CO3	CO2	CO3	CO2	CO4 CO5	CO5	CO4
III.	RES2103	Pulmonary diseases	2	CO1 CO4	CO2	CO3	CO3	CO2	CO6	CO5 CO6	CO5
III.	RES2131	Clinical - I	4	CO2	CO1	CO3	CO2	CO4	CO1	CO3	CO4
III.	*** ****	Open Elective - I	3	*Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department*							
IV.	GPY2201	General Psychology	2	CO1	-	-	-	-	CO2 CO3	CO1 CO2 CO3	-
IV.	BST3201	Biostatistics and research methodology	3	CO1 CO2 CO3 CO5	CO4						
IV.	RES2201	Community medicine	2	CO1 CO3	CO2	CO5	CO1	CO5	CO3	CO4	CO2 CO4
IV.	RES2202	Respiratory Care pharmacology	3	CO1 CO2	CO3 CO5	CO3	CO5	CO4	CO2	CO1	CO4
IV.	RES2231	Clinical - II	7	CO2	CO1	CO3	CO2	CO4	CO1	CO3	CO4
IV.	RES3241	Seminars in Respiratory Care	3	CO1	CO2 CO3	CO4	CO4	CO3	CO2	CO1	C05
IV.	RES3242	HealthCare Management and Law	3	CO1	CO5	CO2	CO3	CO3	CO1 CO5	CO4	CO2
V.	RES3121	Mechanical ventilation - I	3	CO1	CO2	CO3	CO3	CO4	CO4	CO5	CO5
V.	RES3101	Neonatal respiratory care	3	CO1 CO3	CO2	CO3	CO4	CO2	CO5	CO4	CO5
V.	RES3102	Critical care medicine	3	CO3 CO5	CO1 CO4	CO4	CO3	CO2	CO2	CO1	CO5
V.	RES3131	Clinical - III	8	CO4	CO1	CO3	CO2	CO3	CO1	CO2	CO4

Semester	Course Code	Course Title	Credits	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
V.	*** ****	Open Elective -II	3	*Open elective is credited, choice-based and is graded as satisfactory / not satisfactory (S/NS). Students make a choice from pool of electives offered by MAHE institution / Online courses as approved by the department*							
VI.	RES3201	Chronic Respiratory Disease Management	3	CO1	CO2	CO3	CO2	CO3	CO1	CO4	CO4
VI.	RES3222	Mechanical ventilation - II	4	CO1 CO5	CO3 CO4	CO3	CO2	CO2 CO5	CO4	CO1 CO6	CO6
VI.	RES3231	Clinical - IV	10	CO4	CO1	CO2	CO3	CO3	CO1	CO2	CO4
VI.	RES3243	End of life issues & Bioethics	3	CO1	CO1	CO3 CO5	CO3	CO2	CO2 CO5	CO4	CO4
VI.	RES3244	Registry Review	3	CO1	CO2	CO3	CO4	CO2	CO3	CO1	CO4
VII &VIII	-	Internship	Duration: 1 year	CO2 CO6	CO1 CO4	CO3	CO2 CO5	CO4	CO1 CO5	CO3	CO6

8. PROGRAM REGULATIONS

1. Program Structure

1.1. The program is a choice based credit system.
1.2. An academic year consists of two semesters – Odd semester (July - December) and Even semester (January – June)
1.3. Each semester shall extend over a minimum period of 13 weeks (a maximum up to 15 weeks) of academic delivery excluding examination days, semester breaks, declared holidays and non-academic events.
1.4. Medium of instruction shall be in English

2. Credit Distribution

2.1 Each semester would consist of 20 credits.
2.2 The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:
Lecture (L) : 1 Hour /week = 1 credit = 13 hours
Tutorial (T) : 1 Hour /week = 1 credit
Practical (P) : 2 Hours/week = 1 credit
Clinics (CL) : 3 Hours/week = 1 credit
Note: For Basic sciences & Biostatistics course, 1 credit =15 hours (maximum)
2.3 A semester has courses structured as theory, practical, and clinics. Each course is of minimum 2 credits. The maximum credits for theory course is 4; theory and practical combined is 5.
2.4 Internship is not credited.
2.5 Abbreviations / Symbols used in the credit distribution table:
L - Lectures, T - Tutorials, P -Practical, CL - Clinics, C - Total credits, IAC - Internal assessment component, ESE - End-Semester Exam, * Open Elective, # Program Elective

3. Weightage for Internal Assessment Component (IAC) and End Semester Exam (ESE)

3.1. Any one or a combination of marks distribution criteria applicable to a course.

IAC Weightage (%)	ESE Weightage (%)
30	70
50	50
100	Nil
Nil	100

3.2 The IAC component weightage for theory & practical is:
- 50% from Mid-semester examination
- 50% through Continuous assessment (as applicable to course)

3.3 For courses without continuous evaluation components, two sessional exams are conducted and the average of both sessional exams shall be considered as the final IAC.

4. Attendance

4.1 Minimum attendance requirements for each course is:
i. Theory : 75 %
ii. Clinics / Practical : 85 %
4.2 As per the directives of MAHE, there will be no consideration for leave on medical grounds. The student will have to adjust the same in the minimum prescribed attendance. No leverage will be given by the department for any attendance shortage.

4.3 Students requiring **leave** during the academic session should apply for the same through a formal application to the Head of Department through their respective Class In-charge/ Coordinator. The leave will be considered as absent and reflected in their attendance requirements.

4.4 No leverage will be given by the department for any attendance shortage.

4.5 Students, Parents/ guardians can access the attendance status online periodically. Separate intimation regarding attendance status would not be sent to parents/students.

4.6 Students having attendance shortage in any course (theory & practical) will not be permitted to appear for the End-semester exam of the respective course.

5. Examination

5.1 Exams are in two forms – Sessional examination (conducted as a part of internal assessment) and End semester examination.

5.2 The final evaluation for each course shall be based on Internal Assessment Components (**IAC**) and the End-semester examinations **(ESE)** based on the weightage (as indicated in clause 3.1) given for respective courses.

5.3 IAC shall be done on the basis of a continuous evaluation after assessing the performance of the student in mid semester exam, class participation, assignments, seminars or any other component as applicable to a course (as indicated in clause 3.2).

5.4 All the ESE for the odd semesters **(regular ESE)** will be conducted in November-December. All the ESE for the even semesters **(regular ESE)** will be conducted in May-June.

5.5 For those whose failed to clear any course during regular ESE, a **supplementary exam** is conducted 2 weeks immediately after the ESE result declaration to enable him / her to earn those lost credits. When a student appears for supplementary examination, the **maximum grade awarded is "C"** grade or below irrespective of their performance.

5.6 For core courses, the duration of ESE for a 2 credit course would be 2 hours (50 marks) and for a course with 3 or more credits, 3 hours (100 marks).

5.7 For pre / para clinical course and program elective, irrespective of credit (2 or 3), the ESE is conducted out of 50.

5.8 For non-core courses such as Communication skills, Open electives, Indian constitution, Environmental sciences, Yoga or courses as specified in curriculum, only internal assessment is conducted.

6. Minimum Requirements for Pass

6.1. Pass in a course will be reflected as grades. No candidate shall be declared to have passed in any course unless he/she obtains not less than **"E" grade**

6.2. For core courses (theory / practical), candidate should obtain a minimum of 50% (IAC + ESE or as applicable to course) to be declared as pass.

6.3. For non-core including psychology, pre and para clinical course, a candidate should secure a minimum of 40% in ESE to be declared as pass.

6.4. For students who fail to secure a minimum of 'E' grade for a course, an **improvement examination** is conducted to improve their IAC marks. The student can appear for these examination along with the subsequent batches' mid semester / sessional exams. The marks obtained in other components of IAC can be carried forward without reassessment.

7. **Calculation of GPA and CGPA**

7.1. Evaluation and Grading (**Relative Grading**) of students shall be based on GPA (Grade Point Average) & CGPA (Cumulative Grade Point Average).

7.2. The overall performance of a student in each semester is indicated by the Grade Point Average (GPA). The overall performance of the student for the entire program is indicated by the Cumulative Grade Point Average (CGPA).

7.3. A ten (10) point grading system **(credit value)** is used for awarding a letter grade in each course.

Letter Grade	A+	A	B	C	D	E	F/I/DT
Grade points	10	9	8	7	6	5	0

DT – Detained/Attendance shortage, I – Incomplete

7.4 Calculation of GPA & CGPA: An example is provided

Course code	Course	Credits (a)	Grade obtained by the student	Credit value (b)	Grade Points (a x b)
AHS 101	Course - 1	4	B	8	32
AHS 103	Course - 2	4	B	8	32
AHS 105	Course - 3	3	A+	10	30
AHS 107	Course - 4	4	C	7	28
AHS 109	Course - 5	5	A	9	45
TOTAL		**20**	**-**	**-**	**167**

1st Semester GPA = Total grade points / total credits
167/20 = **8.35**

Suppose in **2nd semester GPA** = **7** with respective course credit 25

Then, $\mathbf{1st\ Year\ CGPA} = \frac{(8.35 \text{ x } 20) \ + \ (7 \text{ x } 25)}{20 \ + \ 25} = 7.6$

8. Progression Criteria to higher semesters

8.1 The eligibility for promotion to the next academic year is subject to securing the minimum academic performance as specified below:

- First to second year: a minimum of 70% of the credits at the end of the first year (includes first and second semester)
- Second to third year: a cumulative minimum of 80% of the credits at the end of the second year (includes first, second, third and fourth semester)
- Third year to Internship/externship: Student will be eligible for internship/externship only after successful completion of the entire course work, i.e. 100% credits to be accrued by the end of the third year.

8.2 First year students who have failed to secure a minimum credit (as specified in 8.1), will be on **probation for next one year.** During that period, he / she will not be permitted to attend the second year / III semester classes and have to appear only for exam (during December / May) in order to acquire the missing credits. In the event of failure to acquire the required credits even by the end of second year (70%), he / she has to **exit the program**. Exit from the program is applicable only for first year students failing to acquire the required credits.

8.3 From second year onwards, in the event of failing to acquire required credits (80% or 90%), the students will be on probation. During that period, he / she will not be permitted to attend the classes and have to appear only for exam (during

December / May) in order to acquire the missing credits. From second year onwards, failure to acquire the required credits by the end of subsequent year will not result in exit from program.

8.4 However, the student must complete all the course work requirements and credits by a **maximum of double the program duration**. For e.g. 4 years' program, all the academic course work needs to be completed within 8 years. Failure to do so will result in exit from the program.

9. Semester Break

9.1 Students will have a semester break following their odd and even end-semester examinations.

10. Internship

10.1 Internship / externship will not carry any credits and marks

10.2 Any components/ activities that need to be evaluated as part of internship will be assigned a grade without reflecting it in the CGPA.

10.3 The intern should abide by the rules and regulations of the organization during the period of internship.

10.4 An internship certificate with details of clinical/relevant areas of postings with hours will be issued to a candidate on completion of the Internship. The certificate must be authenticated by the HOD/Coordinator and HOI.

10.5 **Degree is awarded** only on successful completion of internship.

Head of the Department **Dean**

Deputy Registrar - Academics **Registrar**