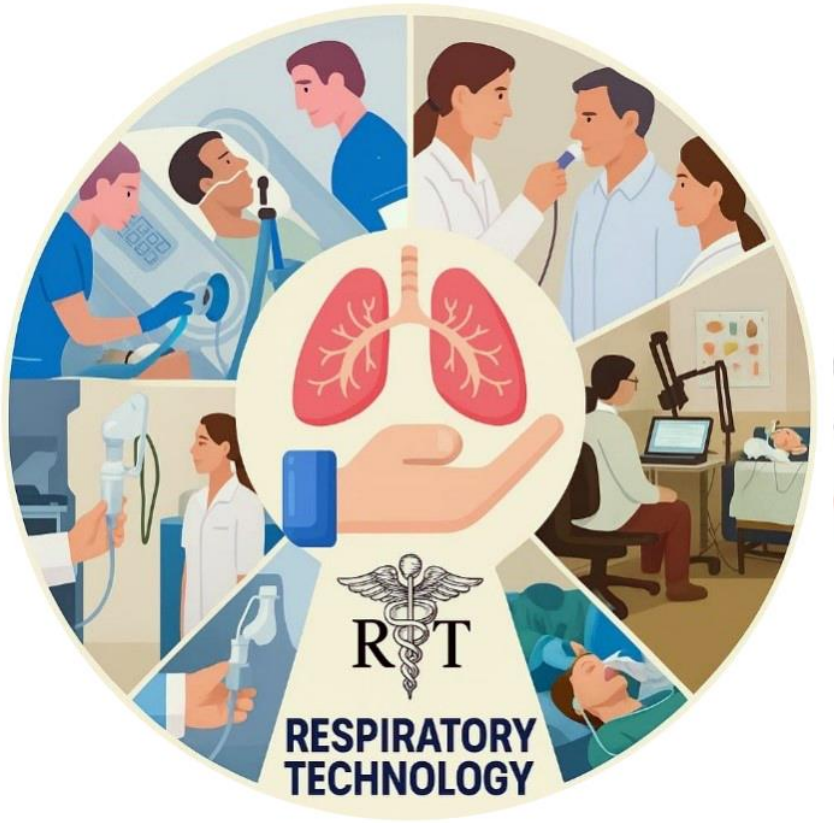
सत्यमेव जयते

# National Commission for Allied and Healthcare Professions

## COMPETENCY BASED CURRICULUM

## For

## RESPIRATORY TECHNOLOGY




**As per NCAHP Act 2021**

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
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# Chapter-1

# Introduction to the Handbook

***(Respiratory Technology Curriculum Handbook)***

# 1.0 Introduction to the Handbook

## 1.1 Background

The **National Respiratory Technology Curriculum Handbook** represents an **upgradation and revision** of earlier model curricula developed by professional associations and academic institutions in India over the past decade. It is aligned with the **National Commission for Allied and Healthcare Professions (NCAHP) Act, 2021**, passed by the Parliament of India on **March 28, 2021** and notified by the Central Government on **May 27, 2021**.

The establishment of the NCAHP Act marks a historic milestone, providing a **regulatory framework for more than 50 allied and healthcare professions**. The Interim Commission was tasked with ensuring nationwide standardization of education, services, and professional recognition for these cadres.

## 1.2 Role of the National Commission for applied and healthcare professions

The Commission's mandate includes:

- Regulation and maintenance of **standards of education and professional services**.
- Assessment and recognition of institutions offering allied and healthcare programs.
- Maintenance of **Central and State Registers** of professionals.
- Encouragement of **research, development, and innovation**.
- Adoption of **latest scientific advancements** and best practices to strengthen India's healthcare delivery system.

Drafting of model curricula has been initiated in a **phased manner**, and Respiratory Technology was prioritized for inclusion in early phases due to its **critical role in intensive care, emergency care, and cardiopulmonary management**, especially highlighted during the COVID-19 pandemic.

## 1.3 Aim of the Curriculum Handbook

This **Respiratory Technology Curriculum Handbook** provides **minimum national standards** for program delivery, curriculum content, clinical training, nomenclature, and assessment. It shifts focus from a purely didactic approach to a **competency-based, outcome-oriented education system**, thereby ensuring the development of **clinically skilled, practice-ready professionals** who can meet the growing demand for respiratory care services.

### 1.4 Purpose and Target Audience

This handbook has been designed to familiarize:

- **Universities and Colleges** – with national minimum standards for program implementation.
- **Healthcare Providers and Institutions** – with expectations from graduates entering the workforce.
- **Faculty and Educators** – with recommended teaching-learning methodologies and assessment tools.
- **Students and Trainees** – with the competencies they must achieve to be considered work-ready.

## Who is a Healthcare Professional?

### 1.5 Definition (as per NCAHP Act, 2021)

A **healthcare professional** is defined as:

*"A scientist, therapist, technologist or other professional who studies, advises, researches, supervises or provides preventive, curative, rehabilitative, therapeutic, or health-promotive services and who has obtained any qualification of degree under this Act, the duration of which shall not be less than 3600 hours over 3 to 6 years divided into specific semesters or terms."*

**Context for Respiratory Technology**

For many years, there was no **statutory regulatory body** for Respiratory Technology in India. With the enactment of the NCAHP Act, 56 professions including **Respiratory Technology** are now formally recognized, regulated, and standardized nationwide.

Respiratory Therapists are classified under**– Allied Health Professionals Specializing in Medical Technology** which includes professionals managing mechanical ventilation, diagnostic testing (spirometry, ABG analysis), and advanced life-support interventions.

### 1.6 Scope and Need for Respiratory Technology Professionals in India

**Changing Healthcare Landscape**

Advances in technology and the increasing prevalence of **chronic respiratory diseases, critical illness, trauma, and perioperative care requirements** have transformed the delivery of healthcare. India faces a dual challenge:

- Rising burden of **non-communicable diseases (NCDs)** such as COPD, asthma, and sleep apnea.
- Increased demand for **critical care services**, including ventilator support, during pandemics and mass casualty events.

This necessitates a cadre of skilled professionals trained in **ventilation management, airway care, oxygen therapy, and cardiopulmonary diagnostics**.

**Role of Respiratory Therapists**

Respiratory Therapists contribute to:

- **Critical Care:** Airway management, invasive and non-invasive mechanical ventilation, weaning and extubation.
- **Emergency Care:** CPR, advanced airway techniques, oxygen and aerosol therapy.
- **Pulmonary Diagnostics:** Spirometry, lung volumes, diffusion studies, polysomnography, and capnography.
- **Chronic Disease Management:** Pulmonary rehabilitation, home ventilation, patient education, and long-term follow-up.
- **Community Health:** Supporting TB, COPD, and sleep-disorder screening programs at primary care level.

Their presence reduces ICU mortality, improves ventilator outcomes, and enhances patient quality of life.

**Learning Goals and Objectives for Respiratory Technology Professionals**

The curriculum emphasizes **performance-based outcomes** rather than time-based training. The learning framework ensures graduates can:

1. **Practice** as responsible members of multidisciplinary ICU teams under the supervision of the intensivist - Safely manage respiratory emergencies, ventilators and diagnostic procedures
2. **Communicate Effectively** – With patients, families, and interdisciplinary teams.
3. **Collaborate as Team Members** – In ICUs, emergency rooms, and rehabilitation centers.
4. **Demonstrate Ethical and Legal Accountability** – Upholding patient rights, confidentiality, and professional standards.
5. **Commit to Professional Excellence** – Continuous improvement in skills and clinical decision-making.
6. **Show Leadership and Mentorship** – Guiding junior staff, participating in training programs.
7. **Exhibit Social Responsibility** – Supporting public health initiatives and promoting preventive respiratory health.
8. **Adopt Scientific Attitude and Scholarship** – Engaging in research, evidence-based practice, and innovation.
9. **Pursue Lifelong Learning** – Staying current with global respiratory care advancements.

## 1.7 Introduction of New Elements in the Competency-Based Curriculum

- **Competency-Based Framework:** Clearly defined outcomes for each year of training, mapped to assessment methods.
- **Self-Directed Learning (SDL):** Encouraging students to take ownership of their learning.
- **Credit-Based System:** Structured per **National Credit Framework (NCrF)** to enable mobility and global recognition.
- **Integrated Curriculum:** Vertical and horizontal integration of basic sciences, clinical exposure, and simulation training.
- **Early Clinical Exposure:** Clinical postings and skill lab training from Year 1 to build confidence.
- **Advanced Teaching Methodologies:** Flipped classrooms, simulation-based training, OSCE/OSPE assessments.
- **Continuous Assessment:** Workplace-based evaluations (Mini-CEX, DOPS), portfolios, reflective learning.

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# Chapter-2

# Methodology of Curriculum Development

## 2.1 Introduction

Developing a Respiratory Technology curriculum must be systematic, evidence-informed, and aligned with the desired professional competencies. In this chapter, we outline a structured methodology to ensure that graduates are prepared to meet the profession's clinical, academic, and ethical demands. We follow an **outcomes-first (backward design)** approach, where the goals and objectives of training are clearly defined.

## 2.2 Step 1 - Outcomes-First (Backward design) approach

We begin with the end in mind by clearly identifying the competencies and professional roles expected of graduates. By defining what learners should be able to achieve upon completion of the program, we ensure that all teaching, learning, and assessment activities are purposefully aligned with the desired outcomes. The curriculum should also define graduate attributes such as clinical proficiency, ethical practice, patient safety, and interprofessional collaboration aligning with national and international competency frameworks or recommendations (e.g., CoARC/NBRC, NCAHP, NABH standards or UGC guidelines).

**Example**: Intensive Care Unit (ICU) Rotation (4 Weeks)

*Expected competencies*: By the end of this rotation, the candidate will be able to achieve the following objectives:

***Mechanical Ventilation***

- Demonstrate knowledge of ventilator components (machine, tubing, circuits, humidifiers).
- Perform troubleshooting and calibration of ventilators before patient use.
- Describe indications for mechanical ventilation and differentiate types of patient interfaces (non-invasive and invasive).
- Interpret basic ventilator waveforms and apply this knowledge to patient care.

***Arterial Blood Gas (ABG) analysis***

- Identify clinical indications for ABG sampling.
- Accurately interpret ABG results in relation to patient condition and management.

***Vascular access and maintenance***

- Demonstrate principles and practices of maintaining arterial and central venous lines, ensuring safety and infection control.

***ICU monitoring***

- Explain intensive care monitoring principles (hemodynamic, respiratory, neurological, etc.).
- Apply monitoring techniques in daily patient management.

## 2.3 Step 2 - Role and job analysis

This step Institution to identify respiratory therapists' real-world tasks, responsibilities, and decision-making processes. The training should ensure that the curriculum reflects current professional practice and prepares graduates to meet workforce and regulatory expectations. Successful implementation of this step prevents the curriculum from being purely academic and ensures graduates are job-ready.

**Process:**

1. Conduct stakeholder consultations (clinicians, educators, employers, regulatory bodies).
2. Review job descriptions, scope-of-practice documents, and emerging trends in respiratory care.
3. Translate findings into **competency statements**.

**Expected outcome:** A competency framework that maps directly to the curriculum content. Broad competencies will be converted to SMART outcomes (e.g., by the second year, students will be able to interpret ABG accurately within three minutes in an OSCE assessment)

## 2.4 Step 3 - Mapping competencies to courses and rotations

**Curriculum Mapping:**

- Assign each competency to specific courses, clinical rotations, and simulation activities.
- Ensure **progressive complexity**- from foundational knowledge to advanced clinical decision-making.

| Competency | Courses | Simulation or lab | Clinical rotation | Assessment Methods | Reason for assessment method |
|---|---|---|---|---|---|
| Demonstrate knowledge of normal cardio-pulmonary physiology and patho-physiology of respiratory diseases | Cardio-pulmonary Physiology (Year 1), Patho-physiology I & II (Year 2) | Case-based discussions, lab demonstrations | N/A | Written exams, concept maps, illustrative scenarios, and problem-solving | Application of knowledge is best captured by narrative writing and illustrative scenarios |
| Perform and interpret arterial blood gas (ABG) analysis | Respiratory Care Techniques (Year 2) | ABG sampling and analysis in lab | ICU Rotation (Year-3) | Lab practical, bedside evaluation, OSCE | Stepwise assessment possible |

| Competency | Courses | Simulation or lab | Clinical rotation | Assessment Methods | Reason for assessment method |
|---|---|---|---|---|---|
| Assist with bronchoscopy procedures, ensuring patient safety and equipment readiness | Advanced Airway Management (Year 3) | Bronchoscopy simulation using airway models or manikins | Bronchoscopy suite (Year 3-4) | Skills checklist, direct observation, case log | Allows direct supervision, feedback, and audit |
| Perform and interpret pulmonary function tests, including spirometry, lung volumes, and DLCO | Pulmonary diagnostics (Year 2–3) | PFT lab practice (spirometry, plethysmography, DLCO) | Pulmonary function lab (Year 3–4) | Practical exam, report interpretation, OSCE | Enables stepwise assessment |
| Initiate and manage invasive and non-invasive mechanical ventilation | *Critical Care* (Year 2–3) | High-fidelity ventilator simulation | ICU Rotation (Year 3) | Direct observation, competency checklist, case log | Allows direct supervision, feedback, and audit |
| Educate patients and families about COPD management | *Pulmonary Rehabilitation & Patient Education* (Year 3) | Role-play, standardized patient encounters | Out-patient Clinic Rotation (Year 3–4) | OSCE, patient education project | Patient scenarios, role play, and OSCE allows feedback and guidance |
| Collaborate effectively within an inter-professional team in acute care settings | *Professional Practice & Ethics* (Year 2) | Inter-professional simulations | Emergency or ICU Rotations (Year 3–4) | 360° evaluation, reflective journal | - |

## 2.5 Step 4 - Selection of Teaching-Learning Methods

This step Institution to select appropriate instructional strategies that best support learners in achieving the identified competencies. Teaching-learning methods should reflect the level of learning (Bloom's taxonomy), the clinical context, and the progression from novice to advanced practitioner. An outline and examples are provided below:

| Competency | Teaching–Learning Methods |
|---|---|
| Initiate and manage invasive and non-invasive mechanical ventilation | High-fidelity ventilator simulation, bedside teaching in ICU, case-based discussions |
| Interpret arterial blood gas (ABG) results | ABG sampling and analysis workshop, lab practice sessions, clinical bedside interpretation |
| Apply principles of ICU monitoring | Lectures on monitoring systems, supervised practice during ICU rounds, post-case debriefings |
| Assist with bronchoscopy procedures | Demonstration by faculty or clinician, simulation using airway models or mannikins, supervised observation |
| Perform and interpret pulmonary function tests (spirometry, lung volumes, DLCO) | PFT lab demonstrations, hands-on practice with equipment, case-based interpretation sessions |
| Educate patients and families about COPD management | Role-play with standardized patients, bedside patient counseling |
| Collaborate effectively within interprofessional team | Team-based learning (TBL), interprofessional simulations, reflection and feedback sessions |

**Technology-enhanced learning strategies** should be used whenever possible to enrich teaching and clinical training. These include:

- **Virtual simulation platforms** that allow learners to practice decision-making in realistic clinical scenarios.
- **High-fidelity manikins with real-time feedback**and **scenario-based simulation**to build psychomotor skills and reinforce correct technique.
- **Telehealth applications** to expose learners to remote monitoring, virtual consultations, and digital health tools increasingly used in practice.

**Examples:**

- Ventilator management and bronchoscopy simulators.
- Advanced Cardiac Life Support (ACLS) and Basic Life Support (BLS) training with devices that provide real-time performance feedback, ensuring all steps are performed accurately and consistently.

## 2.6 Step 5 - Assessment Blueprint

An assessment blueprint links what is taught (curriculum content) and how it is taught (teaching-learning methods) to how it will be evaluated (assessment tools). This guarantees that assessment is not random but systematically aligned with outcomes.

- **Theory assessments:** Multiple choice questions (MCQs), Sort answer questions (SAQs), and essays.
- **Practical assessments:** Objective Structured Clinical Examinations (OSCEs), skills checklists, and workplace-based assessments.
- **Continuous assessment:** Portfolios, reflective journals, and logbooks.

## 2.7 Step 6 - Vertical and horizontal integration

Intended to make learning connected, continuous, and clinically relevant, helping students see the complete picture across subjects, years, and specialties.

**Vertical Integration (Across years)**

Link concepts progressively from basic sciences to applied sciences and clinical practice.

Example:

- Year 1 - Anatomy and Physiology of the respiratory system
- Year 2 - Pathophysiology and ABG interpretation
- Year 3 - Ventilator management in ICU rotations
- Year 4 - Advanced critical care and interprofessional decision-making
- Ensures learners revisit core concepts at increasing levels of complexity.

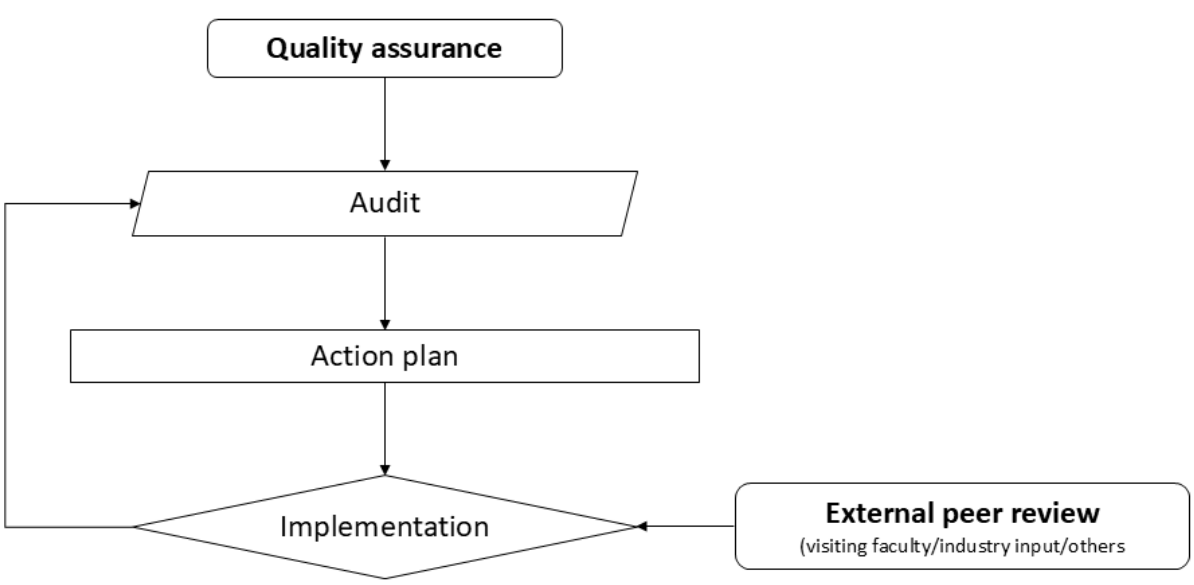
**Horizontal Integration (Across disciplines or specialties)**

- Coordinate teaching within the same academic year across different subjects to reinforce related concepts.
- Example (Year 2):
  - *Pathophysiology*: COPD exacerbations
  - *Pharmacology*: Bronchodilators and corticosteroids
  - *Clinical Skills*: Inhaler technique and nebulizer therapy

This ensures learners see connections across disciplines rather than viewing knowledge in silos

## 2.8 Step 7 - Quality Assurance (QA) Loop

- **Internal reviews:** Periodic curriculum audits by faculty committees.
- **Feedback cycles:** Collect structured feedback from students, clinical preceptors, and graduates.
- **Result audits:** Review graduate performance in licensure exams, job placement, and employer satisfaction.
- **Continuous improvement:** Use QA findings to revise content, teaching methods, and assessments.




Not all candidates will achieve the desired level of clinical competency, requiring remedial teaching.

**Process for Remediation**

*Early Identification,* during informal questioning, quizzes, OSCE practice stations, and others to identify learners at risk before high-stakes exams or rotations.

*Targeted instruction* focusing on the specific area of difficulty (e.g., ventilator troubleshooting, ABG interpretation).

Offering small-group tutorials, one-on-one training, simulations, and others.

*Supplementary clinical hours* to provide more hands-on training (e.g., extra ICU shifts, extended time in PFT lab).

*Repeat Assessments* using multiple methods, such as repeating the OSCE station, submitting a revised case log, and re-taking the written SAQ/MCQ exam.

*Documentation and tracking competency* achievement.

### Curriculum Sustainability

To ensure the curriculum remains relevant and future-ready, sustainability measures are essential.

- **Faculty Development:** Regular training in competency-based teaching, simulation methods, and assessments; maintaining teaching portfolios.
- **Periodic Review:** Formal review every 3–5 years with stakeholder feedback and benchmarking against national (NCAHP) and international standards.
- **CPD Tracking:** Graduates and faculty must engage in CPD, with credits linked to licensure renewal and institutional reporting.
- **Accountability:** Annual sustainability reports and integration into accreditation processes.

## 2.9 Summary

This methodology ensures that the Respiratory Technology curriculum is competency-driven, clinically relevant, and adaptable to evolving healthcare needs. By following an outcomes-first approach, mapping competencies to learning experiences, and embedding robust assessment and QA processes, the program can produce safe, skilled, and ready graduates for professional practice.

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# Chapter-3

# Background of the Profession

## Statement of Philosophy – Why the Respiratory Technology Profession Holds So Much Importance

The profession of Respiratory Technology is integral to modern healthcare, particularly in the treatment and management of patients with acute and chronic respiratory conditions. Respiratory technologists (Respiratory Therapists) play a critical role in ensuring effective breathing and oxygenation—functions that are essential to life. Without timely and expert respiratory care, individuals suffering from respiratory failure, asthma, chronic obstructive pulmonary disease (COPD), pulmonary fibrosis, or other lung conditions face significantly increased risks of morbidity and mortality. Respiratory therapists form a vital link between the patient and a respiratory physician. While the physician examines, diagnoses and prescribes certain therapies for these respiratory illnesses, the implementation of these therapies are effectively carried out by respiratory therapists

Respiratory therapists are vital not only in managing life-threatening respiratory emergencies but also in enhancing long-term pulmonary health. Their core role includes managing mechanical ventilation and airway care, administering oxygen therapy, conducting pulmonary & Sleep diagnostics, delivering aerosolized medications, and guiding patients through pulmonary rehabilitation. Through these efforts, Respiratory Therapists, help improve lung function, prevent complications, and improve patients' overall quality of life.

In critical care settings such as intensive care units (ICUs), emergency departments, neonatal units, and trauma care, Respiratory Therapists serve as indispensable members of the multidisciplinary team. Their ability to quickly assess respiratory distress, initiate interventions, and manage advanced airway devices makes them essential to positive clinical outcomes. Additionally, Respiratory Therapists educate patients and families about managing respiratory diseases and the correct use of inhalers, home ventilators, and other therapeutic devices.

As medical technology advances, the Respiratory Technology profession continues to evolve, adapting new techniques and tools to improve patient care. The growing burden of respiratory diseases worldwide—including those stemming from environmental pollution, smoking, and post-pandemic pulmonary sequelae—underscores the urgent need for highly trained Respiratory Technology professionals in India and globally.

## Background of the Profession in India

In India, structured education in Respiratory Technology began in 1995, marking the initiation of formal academic training in this essential allied health field. These programs were developed in alignment with international standards, particularly mirroring those in countries like the United States, where the profession is well-established.

Since then, Respiratory Technology has grown steadily in India, driven by the rising incidence of respiratory disorders and increasing demand for skilled respiratory professionals. Respiratory Therapists are now widely recognized for their contributions in adult and pediatric intensive care units, neonatal care, pulmonary rehabilitation, pulmonary function testing, polysomnography and more. The expanding scope of the profession also includes academic teaching, clinical research, and medical device industry roles—offering numerous opportunities for both professional advancement and personal fulfilment.

## Scope of Practice for Respiratory Technology Professionals

Respiratory Technology professionals perform a broad range of clinical, diagnostic, educational, and research responsibilities aimed at improving respiratory health and patient outcomes. Their role is multifaceted and spans across all levels of healthcare—from emergency response to chronic disease management.

### 1. Patient Assessment, Diagnosis, and Treatment Planning

Respiratory therapists conduct comprehensive evaluations of patients' respiratory status. This includes gathering medical histories, performing physical examinations, measuring oxygen saturation, performing and interpreting diagnostic tests such as arterial blood gases (ABGs), pulmonary function tests (PFTs), polysomnography, etc., Based on the findings, they help formulate individualized treatment plans in collaboration with physicians and other healthcare providers.

### 2. Airway Management and Ventilator Support

Respiratory Therapists are skilled in airway management techniques, including intubation and tracheostomy care. They are proficient in initiating and adjusting non-invasive and mechanical ventilation, particularly for patients with ARDS, severe pneumonia, COPD exacerbations, or post-operative complications. Respiratory Therapists ensure optimal ventilator settings and respond to emergencies requiring rapid airway interventions. They also transport critically ill patients within and between hospitals.

### 3. Oxygen Therapy and Aerosolized Medications

Respiratory Therapists administers oxygen through various modalities—ranging from nasal cannulas to high-flow devices and non-invasive ventilation (CPAP/BiPAP). They also deliver aerosolized medications like bronchodilators and corticosteroids, tailored to each patient's clinical condition.

### 4. Pulmonary Rehabilitation

Respiratory Therapists design and implement rehabilitation programs to improve the physical and respiratory functioning of patients with chronic lung diseases. These programs incorporate breathing exercises, education, and support to enhance quality of life and reduce hospitalizations.

**5. Critical Care and Emergency Response**

In ICUs and emergency departments, Respiratory Therapists are first responders for patients experiencing respiratory failure. They assist with resuscitation, manage ventilators, and support complex respiratory interventions including ECMO (extracorporeal membrane oxygenation).

**6. Neonatal and Pediatric Respiratory Care**

Respiratory Therapists play a crucial role in caring for neonates and children with underdeveloped or compromised lungs. They manage infant ventilators, provide oxygen therapy, and support children with congenital or acquired respiratory illnesses.

**7. Patient Education and Family Support**

Education is a key aspect of Respiratory Technology. Respiratory Therapists train patients and caregivers on the use of respiratory devices, symptom management, medication adherence, and early recognition of respiratory distress.

**8. Quality Assurance, Safety, and Professional Development**

Respiratory Therapists adhere to safety protocols, participate in quality improvement initiatives, and stay up to date through ongoing professional education. They play a role in infection control, equipment calibration, and clinical audit processes.

**9. Collaborative Effort, Respiratory Therapists and Facility Management**

Respiratory Therapists work closely with physicians, nurses, physical therapists, and other healthcare team members to deliver coordinated care. In many institutions, they also manage the operations of respiratory care units and oversee the clinical deployment of respiratory technology.

**10. Research and Quality Improvement**

Respiratory Therapists engage in research projects that seek to improve respiratory interventions and healthcare delivery. Their work contributes to evidence-based practices and the ongoing innovation in respiratory science and technology.

**Table: Nomenclature based on career progression for Bachelors in Respiratory Technology Technologist.**

| Nomenclature in various sectors for Graduates | | | | Qualification and experience |
|---|---|---|---|---|
| **Clinical** | **Academic** | **Industry/ Management** | **Research** | |
| Respiratory Care Technologist | Clinical Instructor (or) Preceptor/ Demonstrator | Respiratory Technology Application Specialist | Research Assistant | BSRT with 0-4 years' experience post BSRT |
| Respiratory Therapist | | | | |
| Senior Respiratory Care | Clinical supervisor | Senior (Respiratory) Application Specialist | Research Assistant | BSRT with 4 -6 years' experience post BSRT |
| Technologist | | | | |
| Senior | | | | |
| Respiratory Therapist | | | | |
| Chief Respiratory Care | Lecturer | Lead Application Specialist (Respiratory) | Research Associate | BSRT with 6-8years' experience post BSRT |
| Technologist | | | | |
| Chief Respiratory Therapist | | | | |
| Deputy Manager Respiratory Care | - | Regional Application | Research Associate | BSRT with 12 years' experience Post BSRT. |
| Manager Respiratory Care | - | - Specialist (Respiratory) | - | BSRT with 15 years' experience Post BSRT. |

**Table: Nomenclature based on career progression for Masters in Respiratory Technology & Doctorate in Respiratory Technology**

| Nomenclature in various sectors for Post Graduates & Doctorate | | | | Qualification and experience |
|---|---|---|---|---|
| **Clinical** | **Academic** | **Industry/ Management** | **Research** | |
| Respiratory Therapist | Lecturer | Clinical Respiratory Therapist | | MSRT with 0-2 years experience post MSRT out of which one year must have been spent in Respiratory Care Education or Administration after obtaining the prescribed post graduate qualifications. |
| Senior Respiratory Therapist | Assistant Professor | Lead Respiratory Clinical Therapist | | Master's Degree in Respiratory Care (MSc) with advanced specialization in Respiratory Care.<br>Must have a Bachelor's degree in Respiratory Care/Therapy/Technology (BScRT). Five (5) of experience in Respiratory Care field out of which five (3) years must have been spent in Respiratory Care Education or Administration after obtaining the prescribed post graduate qualifications.<br>Must have minimum one/or more publications in an MCI recognized/indexed journal |

| Nomenclature in various sectors for Post Graduates & Doctorate | | | | Qualification and experience |
|---|---|---|---|---|
| **Clinical** | **Academic** | **Industry/ Management** | **Research** | |
| Chief Respiratory Therapist | Associate Professor | Deputy Manager Respiratory Technology | | Master's & Bachelor's Degree in Respiratory Care/Therapy/Technology (BSc. RT).<br><br>Eight years (8) of experience in Respiratory Care field out of which five (5) years must have been spent in Respiratory Care Education or Administration after obtaining the prescribed post graduate qualifications.<br><br>Desirable Qualification: Higher Qualification like Ph.D. in any discipline in respiratory care recognized by the UGC<br><br>Must have minimum 3 publications in an MCI recognized/indexed journal. |

| Nomenclature in various sectors for Post Graduates & Doctorate | | | | Qualification and experience |
|---|---|---|---|---|
| **Clinical** | **Academic** | **Industry/ Management** | **Research** | |
| Manager | Professor/ HOD | Manager-Respiratory Technology | | Master's & Bachelor's Degree in Respiratory Care/Therapy/Technology (BSc. RT).<br><br>Desirable Qualification: Higher Qualification like Ph.D. in any discipline in respiratory care recognized by the UGC<br><br>Ten years (10) of experience in Respiratory Care field out of which five (5) years must have been spent in Respiratory Care Education or Administration after obtaining the prescribed post graduate qualifications.<br><br>Must have minimum 5 publications in an MCI recognized/indexed journal. |
| Director | Dean / Principal | National Head/ Product Manager | | MSRT with12 years post MSRT PhD (RT) with10years post PhD (RT) |

**Educational Pathways in Respiratory Technology**

The development of Respiratory Technology professionals is structured through a clear educational pathway that includes Bachelor's, Master's, and Doctoral degrees. Each degree is designed to provide students with the knowledge, skills, and competencies required to work at varying levels of expertise in clinical, academic, and research settings.

**Bachelor's Degree in Respiratory Technology (BSRT) – 4 years**

The Bachelor's program prepares students with fundamental knowledge and clinical skills in respiratory care. This includes hands-on training in patient assessment, mechanical ventilation, respiratory pharmacology, and pulmonary rehabilitation.

**Master's Degree in Respiratory Technology (MSRT) – 2 years**

The Master's program enhances the clinical and research abilities of Respiratory Technology professionals. It includes advanced coursework in respiratory physiology, therapeutic interventions, critical care management, and research methodologies. Graduates from this program are equipped to take on senior clinical and academic roles.

**Doctoral Degree in Respiratory Technology (PhD) – 3-4 years, full time: 5-7 years- Part time**

A PhD in Respiratory Technology is for professionals who wish to engage in high-level research, innovation, and leadership in the field. Doctoral candidates conduct research to explore new treatment modalities, develop improved patient care techniques, and contribute to the scientific literature in Respiratory Technology. PhD graduates can take on roles as research directors, clinical leaders, and academic professors.

**Job Availability and Career Opportunities**

Graduates of Respiratory Technology programs can expect a wide range of employment opportunities in both clinical and non-clinical settings. These include hospitals, rehabilitation centers, research institutions, and educational facilities.

**Clinical Settings:**

Hospitals (ICUs, ER, General care, Pulmonary function & polysomnography Labs) Critical care units (mechanical ventilation management, ECMO) Long-term care facilities Homecare services

**Academic Settings:**

- **Master's and PhD-level professionals** can take roles as educators, lecturers, or professors in universities and medical schools, helping train the next generation of respiratory professionals. They may also conduct research and contribute to the development of educational curricula.

**Industry & Research:**

- **Research Opportunities**: PhD graduates have the opportunity to work in both public and private research labs, focusing on improving respiratory therapies, devices, and technologies.
- **Industry Roles**: Graduates may also find employment in the medical device industry, working with manufacturers of respiratory equipment (e.g., ventilators, CPAP devices) or in pharmaceutical companies that specialize in respiratory medications.

**International Opportunities:**

The global demand for skilled respiratory professionals is high, and graduates of Respiratory Technology programs are often well-regarded internationally. Many professionals move abroad to work in countries with an increasing need for advanced respiratory care, providing them with exposure to diverse healthcare systems and the opportunity to enhance their skills.

**Conclusion: Shaping the Future of Respiratory Technology**

Respiratory Technology is a vital component of modern healthcare, especially given the increasing prevalence of chronic respiratory conditions and acute lung diseases worldwide. The structured career pathway from Bachelor's to PhD provides opportunities for professionals to advance within clinical practice, engage in academic teaching, or pursue cutting-edge research. By offering Bachelor's, Master's, and PhD programs, the Respiratory Technology profession can continuously evolve, contributing to the improvement of global healthcare and the development of life-saving respiratory interventions.

The future of Respiratory Technology is one of expanding opportunities and the increasing recognition of the essential role these professionals play in patient care, education, and innovation in healthcare systems worldwide.

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
स्वास्थ्यम् सर्वार्थसाधनम्
NCAHP
Since-2021
राष्ट्रीय सहबद्ध और स्वास्थ्य देख-रेख व्यवसाय

# Chapter-4

# Bachelor of Respiratory Technology (BSc RT)

## Course Regulations and Curriculum

### 1. General Information

| Section | Details |
|---|---|
| **Medium of Instruction** | English shall be the medium of instruction for all subjects of study and for examinations. |
| **Eligibility** | • Candidates must have completed 10+2 with Physics, Chemistry and Biology with a PASS marks.<br>• Admission on the basis of 10+2 marks in Physics, Chemistry and Biology subjects. |

### 2. General Rules

| Clause | Regulation |
|---|---|
| **Duration of the Program** | 1. The program shall consist of **8 semesters**, including **two semesters of internship**, and should be completed within **6 years** from the date of admission.<br>2. One academic year consists of **two semesters**. Each semester shall extend over a minimum of **16 weeks**, excluding examination days.<br>3. Semester Distribution:<br>• **Odd Semesters (1, 3, 5, 7):** August – January<br>• **Even Semesters (2, 4, 6, 8):** February – July<br>4. Examinations shall be held at the end of each semester followed by:<br>• Minimum 1-week vacation after odd semesters<br>• Minimum 3-week vacation after even semesters<br>5. **Number of working days per semester:** Maximum 100 days. |
| **Discontinuation of Studies** | Rules for discontinuation will be those prescribed by the NCAHP |
| **Educational Methodology** | Learning occurs through:<br>• Didactic lectures<br>• Training in the workplace under supervision<br>• Self-study and reading<br>• Seminars, case presentations, and assignments<br>• Materials provided by faculty and professional associations |

### 3. Examination Regulations

| Clause | Regulation |
|---|---|
| **Attendance** | 75% physical attendance is mandatory. Medical/sanctioned leave will not count as attendance. Attendance will be calculated from session commencement until the last day of the final examination. |
| **Internal Assessment** | 1. Minimum two theory sessional exams and preferably one practical exam per semester.<br>2. Average of two exams will be considered for internal marks.<br>3. Minimum **50% marks** required in internal assessment (theory & practical separately) to be eligible for Final exams.<br>4. Logbook maintenance is mandatory.<br>5. Weightage: **20% of total marks** in each subject.<br>6. Pre-Final examinations to be conducted 2–3 weeks before Final examination. |
| **Final examinations** | 1. Conducted at the end of every semester.<br>2. Minimum pass mark: 50% (separately in theory & practical).<br>3. Students failing theory or practical must reappear for both.<br>4. Maximum attempts per paper: **4** (including first attempt).<br>5. Course must be completed within **6 years**.<br>6. Practical examination batch size: 12–15 students per day.<br>7. Joint evaluation by one internal and one external examiner in final semester. |
| **Eligibility for Final exam** | Requires 50% in internal assessment and 75% attendance. |
| **Valuation & Revaluation** | 1. Valuation to be conducted at Institution premises.<br>2. Revaluation permitted; fees decided by NCAHP<br>3. Application to be submitted within 10 days from result date. |
| **Supplementary Examinations** | Held within 4–6 months after regular exam. Internal marks from previous exams may be carried forward unless fresh marks are provided. |
| **Academic Progression** | 1. Courses from I–III semester may be carried forward until IV semester.<br>2. V semester courses cannot be taken until I & II semesters are cleared.<br>3. Internship can begin only after clearing I–VI semesters.<br>4. Maximum of **4 attempts** per course.<br>5. No odd batches permitted. |

## 4. Criteria for Pass and Grading System

| Criteria | Requirement |
|---|---|
| **Pass Criteria** | • Minimum 50% in Internal Assessment<br>• 50% in FINAL Theory + Viva<br>• 50% in FINAL Practical/Clinics<br>• **Overall 50% aggregate** required for pass |
| **Letter Grades & Grade Points** | |

| Percentage of Marks | Letter Grade | Grade Point | Performance |
|---|---|---|---|
| 90.00 – 100.00 | O | 10 | Outstanding |
| 80.00 – 89.99 | A | 9 | Excellent |
| 70.00 – 79.99 | B | 8 | Good |
| 60.00 – 69.99 | C | 7 | Fair |
| 50.00 – 59.99 | D | 6 | Average |
| < 50.00 | F | 0 | Fail |
| Absent | AB | 0 | Fail |

| SGPA (Semester Grade Point Average) | Formula |
|---|---|
| Calculation | $SGPA = (C_1G_1 + C_2G_2 + \dots + C_5G_5) \div (C_1 + C_2 + \dots + C_5)$ |

| CGPA (Cumulative Grade Point Average) | Formula |
|---|---|
| Calculation | $CGPA = (C_1S_1 + C_2S_2 + \dots + C_6S_6) \div (C_1 + C_2 + \dots + C_6)$ |

| Class Awarded Based on CGPA | |
|---|---|
| First Class with Distinction | CGPA ≥ 7.50 |
| First Class | CGPA 6.00 – 7.49 |
| Second Class | CGPA 5.00 – 5.99 |

## 5. Internship Regulations

| Clause | Regulation |
|---|---|
| **Eligibility for Internship** | Internship must be done at the hospitals prescribed by the Institution where course is conducted. Students must have cleared all courses (I–VI semesters) to be eligible.<br>• Internship must be continuous except under extraordinary circumstances approved by Principal.<br>• Must be completed within 18 months of becoming eligible.<br>• Internal viva to be conducted at the end of VII semester and 1 month before completion of VIII semester. |

## 6. Curriculum

| Semester | Course Code | Paper | Course Title | Credit Distribution (L–T–P–CL) | Total Credits |
|---|---|---|---|---|---|
| **First Semester (Year 1)** | RTY101 | Paper I | Human Anatomy & Histology | 2–1–3–0 | 4 |
| | RTY102 | Paper II | Human Physiology | 2–1–3–0 | 4 |
| | RTY103 | Paper III | Biochemistry for Health Sciences | 2–1–3–0 | 4 |
| | RTY104 | Paper IV | Communication Skills & Health Informatics | 2–1–3–0 | 4 |
| | RTY105 | Paper V | Medical Terminology & Documentation | 2–1–3–0 | 4 |
| **Second Semester (Year 1)** | RTY201 | Paper VI | Community Health & Preventive Medicine | 2–2–1–0 | 4 |
| | RTY202 | Paper VII | Medical Microbiology | 2–1–3–0 | 4 |
| | RTY203 | Paper VIII | Behavioral Sciences & Clinical Psychology | 2–1–3–0 | 4 |
| | RTY204 | Paper IX | Patient Assessment & Contact Techniques (T&P) | 2–2–2–10 | 8 |

| Semester | Course Code | Paper | Course Title | Credit Distribution (L–T–P–CL) | Total Credits |
|---|---|---|---|---|---|
| **Third Semester (Year 2)** | RTY301 | Paper X | Applied Pathology | 2–1–3–0 | 4 |
| | RTY302 | Paper XI | Pharmacology for Respiratory Care | 2–1–3–0 | 4 |
| | RTY303 | Paper XII | Pulmonary Diseases – I | 2–1–3–0 | 4 |
| | RTY304 | Paper XIII | Fundamentals of Respiratory Care (T&P) | 3–1–1–11 | 8 |
| **Fourth Semester (Year 2)** | RTY401 | Paper XIV | Pulmonary Diseases – II | 2–1–3–0 | 4 |
| | RTY402 | Paper XV | Diagnostic & Therapeutic Procedures in Respiratory Care (T&P) | 1–1–1–2 | 3 |
| | RTY403 | Paper XVI | Principles of Mechanical Ventilation – I (T&P) | 2–1–1–2 | 4 |
| | RTY404 | Paper XVII | Applied Cardiopulmonary Anatomy & Physiology | 2–1–0–0 | 3 |
| | RTY405 | Paper XVIII | Clinical Practicum I | 0–0–2–16 | 6 |
| **Fifth Semester (Year 3)** | RTY501 | Paper XIX | Biostatistics, Research Methodology & Ethics | 2–1–0–0 | 3 |
| | RTY502 | Paper XX | Critical Care & Advanced Cardiothoracic Respiratory Care (with ACLS) | 3–2–1–2 | 6 |
| | RTY503 | Paper XXI | Neonatal & Pediatric Respiratory Care | 2–2–3–3 | 6 |

| Semester | Course Code | Paper | Course Title | Credit Distribution (L–T–P–CL) | Total Credits |
|---|---|---|---|---|---|
| | RTY504 | Paper XXII | Clinical Practicum II | 0–0–2–13 | 5 |
| **Sixth Semester (Year 3)** | RTY601 | Paper XXIII | Principles of Mechanical Ventilation – II (T&P) | 3–1–1–2 | 5 |
| | RTY602 | Paper XXIV | Pulmonary Rehabilitation & Sleep Medicine | 3–1–3–3 | 6 |
| | RTY603 | Paper XXV | Research Project / Dissertation | 1–1–3–3 | 3 |
| | RTY604 | Paper XXVI | Clinical Practicum III | 0–0–2–16 | 6 |
| **Seventh & Eighth Semesters (Year 4)** | RTY701 | Paper XXVII | Internship – Phase I (7th Semester) | 0–0–0–720 | 18 |
| | RTY801 | Paper XXVIII | Internship – Phase II (8th Semester) | 0–0–0–720 | 18 |

Each semester would consist minimum of 20 credits.
The credit distribution hours for Lecture, Tutorial, Practical, and Clinics are as follows:
Lecture (L) : 1 Hour /week = 1 credit = 15 hours
Tutorial (T) : 1 Hour /week = 1 credit
Practical (P) : 2 Hours/week = 1 credit
Clinics (CL) : 3 Hours/week = 1 credit
Internship is not credited.
Abbreviations/symbols used in the credit distribution table: L - Lectures, T - Tutorials, P - Practical, CL- Clinics
Internship is for 12 months (August – January; February – July) or 1 year. Total number of days (after deducting for national holidays & Sundays + Examination): 250 days (6 days / week; 9 hours / day)
1500 hours or minimum of 18 weeks /semester (216 days).

## Learning Outcomes

### Program-Level Learning Outcomes (PLOs)

At the end of the 4-year **B.Sc. in Respiratory Technology** program, graduates will be able to:

1. **Apply foundational sciences** (anatomy, physiology, pathology, pharmacology, microbiology, biochemistry) to clinical decision-making in respiratory care.
2. **Demonstrate proficiency** in patient assessment and respiratory care techniques, including diagnostic procedures, mechanical ventilation, and rehabilitation.
3. **Deliver evidence-based respiratory care** in acute, chronic, neonatal, and cardiothoracic conditions.
4. **Use technology and informatics** (IT, diagnostic devices, ventilators, polysomnography systems) to support patient care and clinical documentation.
5. **Communicate effectively** with patients, families, and healthcare teams using appropriate medical terminology and professional etiquette.
6. **Apply research methodology and biostatistics** to critically appraise evidence and contribute to respiratory care research.
7. **Exhibit professional behavior and ethics** consistent with healthcare standards, demonstrating compassion, accountability, and leadership.
8. **Engage in lifelong learning and CPD** (Continuous Professional Development) to adapt to evolving technologies and practices.
9. **Perform effectively in interprofessional healthcare teams**, contributing to holistic, patient-centered care.
10. **Demonstrate readiness for advanced training or specialization** in critical care, pulmonary rehabilitation, neonatal care, or academia.

### Course-Level Learning Outcomes (by Semester)

#### Year 1

**Semester I**

- Understand the structure and function of human body systems (**RTY101–RTY102**).
- Apply biochemical principles to clinical and physiological processes (**RTY103**).
- Develop basic IT, communication, and English language proficiency for healthcare settings (**RTY104**).
- Use correct medical terminology and maintain accurate healthcare documentation (**RTY105**).

**Semester II**

- Apply principles of community health and preventive medicine in respiratory care practice (**RTY201**).
- Identify microbial causes of respiratory infections and apply infection prevention and control measures (**RTY202**).
- Recognize psychological and behavioral aspects influencing patient care (**RTY203**).
- Perform patient assessment and basic respiratory care procedures safely under supervision (**RTY204**)

## Year 2

**Semester III**

- Interpret pathological processes relevant to respiratory and systemic diseases (**RTY301**).
- Apply pharmacological principles in the management of respiratory disorders (**RTY302**).
- Understand and describe pulmonary diseases – Part I (**RTY303**).
- Perform foundational respiratory care techniques including oxygen therapy, aerosol therapy, suctioning, and airway management (**RTY304**).

**Semester IV**

- Integrate advanced knowledge of pulmonary diseases and their management (**RTY401**).
- Perform diagnostic and therapeutic respiratory procedures including PFTs, ABG analysis, and imaging interpretation (**RTY402**).
- Apply basic principles and techniques of mechanical ventilation – Part I (**RTY403**).
- Correlate cardiopulmonary anatomy and physiology with clinical respiratory care applications (**RTY404**).
- Demonstrate competency in clinical Respiratory Technology skills through supervised practice (**RTY405**).

## Year 3

**Semester V**

- Apply principles of biostatistics, research methodology, and ethics in Respiratory Technology practice (**RTY501**).
- Manage cardiothoracic and critical care patients including airway management and ACLS interventions (**RTY502**).
- Provide neonatal and pediatric respiratory care including advanced ventilation and monitoring (**RTY503**).
- Demonstrate advanced practical skills and clinical integration in Respiratory Technology (**RTY504**).

**Semester VI**

- Apply advanced mechanical ventilation strategies, including non-invasive ventilation and patient-ventilator synchrony optimization (**RTY601**).
- Provide pulmonary rehabilitation and manage sleep-related breathing disorders using polysomnography and titration techniques (**RTY602**).
- Design, execute, and present a small-scale research project or dissertation in Respiratory Technology (**RTY603**).
- Demonstrate advanced clinical competence and independent problem-solving in respiratory care (**RTY604**).

## Year 4

**Semesters VII & VIII – Internship (RTY701 & RTY801)**

- Perform supervised clinical practice across all major areas of Respiratory Technology — critical care, neonatology, pulmonary rehabilitation, emergency care, and sleep medicine.
- Apply theoretical knowledge to real-world clinical situations under supervision.
- Demonstrate independent decision-making, professional accountability, and evidence-based reasoning in patient management.
- Exhibit teamwork, leadership, and effective communication within multidisciplinary healthcare environments.
- Prepare for transition to professional roles and lifelong learning in Respiratory Technology.

## HUMAN ANATOMY & HISTOLOGY

**Total Hours:** 80 Theory + 10 Practical/Demo = **90 Hours**

**Course Objectives**

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

1. Describe the gross and microscopic anatomy of various human body systems.
2. Identify structures relevant to respiratory and cardiovascular functions.
3. Correlate anatomical features with clinical and radiological applications.
4. Recognize histological characteristics of major tissues and organs.

**THEORY**

| Sl. No. | Name of the Topic | Subtopics | No. of Hours |
|---|---|---|---|
| 1 | The Human Body as a Whole | Definition, subdivisions, anatomical positions, fundamental planes, vertebrate structure, organization of body cells & tissues | 5 |
| 2 | Locomotion and Support | Skeletal system, bone classification, skull (foramen magnum, maxilla), axial & appendicular skeleton, joints & movements | 5 |
| 3 | Muscles | Classification, structure, muscles of respiration, diaphragm, head, neck, and abdominal wall | 5 |
| 4 | Thorax | Thoracic cavity & wall, mediastinum, thoracic duct, surface markings, clinical anatomy | 5 |
| 5 | Anatomy of Nervous System | Divisions of CNS & PNS, spinal cord & reflex arc, spinal nerves | 5 |
| 6 | Brain | Gross features, divisions (forebrain, midbrain, hindbrain), meninges, blood supply, spinal cord, clinical anatomy | 5 |

| Sl. No. | Name of the Topic | Subtopics | No. of Hours |
|---|---|---|---|
| 7 | Anatomy of Cardiovascular System | Heart, chambers, valves, conduction system, coronary arteries, pericardium, cardiac cycle, innervation | 5 |
| 8 | Great Vessels | Arteries, veins, aorta, SVC, IVC, pulmonary circulation, lymphatic drainage | 5 |
| 9 | Anatomy of Respiratory System | Nose, pharynx, larynx, trachea, bronchial tree, lungs, alveoli, pleura | 5 |
| 10 | Organization of Respiratory System | Muscles of respiration, gross structure of lungs, pleural coverings, pulmonary vessels, nerve supply | 5 |
| 11 | Excretory System | Kidney, ureter, bladder, urethra, blood & nerve supply, applied anatomy | 5 |
| 12 | Male & Female Reproductive System | Male: testis, ducts, prostate; Female: ovary, uterus, vagina, accessory organs | 5 |
| 13 | Endocrine System | Pituitary, thyroid, parathyroid, adrenal, pancreas, gonads – location, hormones & function | 5 |
| 14 | Genetics | Chromosomes, karyotyping, chromosomal anomalies | 5 |
| 15 | Special Senses | Eye, ear, skin – structure & clinical anatomy | 5 |
| 16 | Lymphatic Organs | Tonsil, spleen, thymus – structure, function, and applied anatomy | 5 |
| **Total Theory Hours** | | | **80** |

**PRACTICALS / DEMONSTRATIONS**

| Section | Subtopics | Hours |
|---|---|---|
| **General Slides** | Hyaline, fibro-, elastic cartilage; bone (T.S. & L.S.); blood vessels; lymphoid tissues; epithelial, skeletal & cardiac muscle; peripheral nerve | 3 |
| **Systemic Slides** | GIT, lung parenchyma, kidney, endocrine glands (pituitary, adrenal, thyroid, parathyroid, pancreas), reproductive organs | 3 |
| **Demonstrations** | Bone & joint identification, brain & spinal cord, heart & vessels, diaphragm, lungs (histology & X-rays), kidney, spleen, liver, pancreas | 4 |
| **Total Practical Hours** | | **10** |

**Learning Outcomes**

- Identify the structure and organization of human tissues and organs.
- Explain functional anatomy of the thorax and respiratory system.
- Relate anatomical knowledge to clinical and diagnostic practice.
- Recognize microscopic structures under the microscope.

## HUMAN PHYSIOLOGY

**Total Hours:** 100 (Theory + Practical)

**Course Objectives**

By the end of the course, students will:

1. Understand the normal functioning of major organ systems.
2. Correlate physiological processes with mechanisms of respiration and circulation.
3. Apply physiological principles in patient assessment and clinical decision-making.

**THEORY**

| Sl. No. | Topic | Subtopics | Hours |
|---|---|---|---|
| 1 | Blood Composition | Properties and functions | 1 |
| 2 | Red Blood Cells | RBC structure, hemoglobin, erythropoiesis | 1 |
| 3 | White Blood Cells | Function, life span, count | 1 |
| 4 | Platelets | Structure, function, clotting time | 1 |
| 5 | Plasma Proteins | Types, functions | 1 |
| 6 | Blood Grouping | ABO, Rh, inheritance, significance | 2 |
| 7 | Blood Transfusion | Cross-matching, complications, Rh incompatibility | 2 |
| 8 | Anemia | Classification, causes, treatment | 2 |
| 9 | ESR & PCV | Determination, significance | 1 |
| 10 | Blood Volume | Regulation, composition of body fluids | 1 |
| 11 | Hemostasis | Clotting mechanism, factors, disorders | 1 |
| 12 | Cardiovascular System | Cardiac cycle, output, HR, conduction system | 5 |
| 13 | Cardiovascular Regulation | Local & systemic regulation, baroreceptors, circulation in organs | 5 |
| 14 | ECG | Basics, normal and abnormal interpretation | 4 |
| 15 | Muscle & Nerve Physiology | Action potential, NMJ, tone, fatigue | 3 |

| Sl. No. | Topic | Subtopics | Hours |
|---|---|---|---|
| 16 | Respiratory Physiology | Respiratory anatomy, mechanics, compliance, regulation, volumes, diffusion, V/Q ratio, applied physiology | 27 |
| 17 | Endocrine System | Pituitary, thyroid, adrenal, pancreas, PTH, hormone mechanisms | 4 |
| 18 | Nervous System | Reflexes, CSF, ANS | 3 |
| 19 | Special Senses | Vision, hearing, taste, smell | 2 |
| 20 | Temperature Regulation | Hypothalamus, fever, thermoregulation | 2 |
| 21 | Digestive System | GIT secretion, digestion, absorption | 6 |
| 22 | Renal System | Nephron, urine formation, RFTs | 4 |
| 23 | Reproductive System | Physiology, hormones, cycle, pregnancy | 3 |
| **Total Theory Hours** | | | **80** |

**PRACTICAL / DEMONSTRATION**

| Activity | Hours |
|---|---|
| Hemocytometer, hemoglobinometry, blood grouping, RBC/WBC count | 4 |
| BP recording, heart sounds, ECG tracing & interpretation | 4 |
| Vital capacity, stethography, reflex testing | 4 |
| Effect of exercise on BP/pulse, artificial respiration | 4 |
| **Total Practical Hours** | **20** |

**Learning Outcomes**

- Explain physiological functions of blood, cardiovascular, and respiratory systems.
- Measure basic physiological parameters (BP, ECG, pulmonary volumes).
- Interpret normal and abnormal findings in physiological assessments.
- Apply knowledge to respiratory care procedures.

## BIOCHEMISTRY FOR HEALTH SCIENCES

**Total Hours:** 90 (Theory: 70 + Practical/Clinic: 20)

**Course Objectives**

Students will be able to:

1. Understand biochemical principles underlying body function and metabolism.
2. Relate biochemical changes to diseases affecting respiratory and metabolic systems.
3. Interpret results of clinical biochemistry investigations.

**THEORY**

| Sl. No. | Topic | Subtopics | Hours |
|---|---|---|---|
| 1 | Introduction to Apparatus | Chemical balance, molecular/atomic weight, molarity, normality, standards | 1 |
| 2 | Atomic Structure | Acids, bases, salts, pH, buffers | 2 |
| 3 | Carbohydrates | Structure, classification, examples | 2 |
| 4 | Proteins | Structure, types, examples | 2 |
| 5 | Nucleic Acids | DNA, RNA, functions | 2 |
| 6 | Vitamins | Fat- & water-soluble vitamins, sources, deficiency, toxicity | 3 |
| 7 | Cell Structure | Organelles, biomembrane, transport | 2 |
| 8 | Digestion & Absorption | Nutrient absorption, iron transport | 2 |
| 9 | Enzymes | Classification, kinetics, inhibition | 2 |
| 10 | Amino Acids | Structure, ionic properties, electrophoresis | 2 |
| 11 | Carbohydrate Metabolism | Glycolysis, glycogen, polysaccharides | 3 |
| 12 | Minerals | Ca, P, Mg, Fe, Zn, I, Se, F – roles, sources, toxicity | 3 |
| 13 | Hormones | Mechanism, pituitary, thyroid, adrenal, pancreas, PTH | 4 |
| 14 | Renal Function Test | Clearance tests, NPN, urine analysis | 2 |
| 15 | Biochemistry of Cancer | Tumor markers, oncogenes | 2 |
| **Total Theory Hours** | | | **70** |

**CLINICAL BIOCHEMISTRY / PRACTICALS**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Specimen collection (Blood, Urine, CSF) | 2 |
| 2 | Principles of biochemical investigations | 1 |
| 3 | Liver Function Tests | 2 |
| 4 | Renal Function Tests | 2 |
| 5 | Hormonal Evaluation | 1 |
| 6 | Cardiac Profile – MI markers | 2 |
| 7 | Enzymes & their significance | 2 |
| 8 | Nutrition & digestion | 1 |
| 9 | Acid-Base Status | 3 |
| 10 | Blood Gases & Electrolytes | 4 |
| **Total Practical Hours** | | **20** |

**Learning Outcomes**

- Explain biochemical principles of metabolism and regulation.
- Identify the biochemical basis of disease and diagnostic parameters.
- Perform and interpret basic biochemical and electrolyte investigations.
- Relate acid-base and metabolic balance to respiratory care practice.

## Communication Skills & Health Informatics

| Sl. No. | Topic | Sub-contents | Hours |
|---|---|---|---|
| 1 | Basic Usage of Computer | Operating system basics, File handling, Internet usage, Email | – |
| 2 | Microsoft Excel | Basics, Functions, Charts, Data handling | – |
| 3 | Microsoft PowerPoint & Word | Presentation slides, Document preparation, Formatting | – |
| 4 | Presentation Skills | Basics of presentation using technology, Effective delivery | – |
| 5 | English – Basics & Advanced | Grammar, Vocabulary, Sentence structure | – |
| 6 | Written English | Report writing, Essay, Letters | – |
| 7 | Spoken English | Conversational skills, Pronunciation, Fluency | – |
| 8 | Listening Skills | Comprehension, Audio exercises, Note-taking | – |

**Medical Terminology & Documentation**

**Course Outline**

| Unit No. | Content | Hours |
|---|---|---|
| **Unit I: Basics of Medical Terminology** | - Introduction to medical terminology and its importance in healthcare communication.<br>- Derivation and origin of medical terms (Latin and Greek roots).<br>- Word roots, prefixes, suffixes – meaning and application.<br>- Rules for combining morphemes, plurals, and pronunciation conventions. | 4 |
| **Unit II: Formation and Interpretation of Medical Terms** | - Construction of medical terms using roots, suffixes, prefixes, and combining vowels.<br>- Identification and meaning of commonly used basic medical terms.<br>- Interpretation of abbreviations, acronyms, and symbols commonly used in healthcare documentation.<br>- Reading and interpreting medical orders, case sheets, and reports. | 8 |
| **Unit III: System-based Medical Terminology** | - Terminology related to major body systems:<br>▪ Circulatory system<br>▪ Nervous system<br>▪ Digestive system<br>▪ Respiratory system<br>▪ Urinary system<br>▪ Reproductive system<br>▪ Endocrine system<br>▪ Musculoskeletal system | 12 |
| **Unit IV: Disease-specific and General Medical Terms** | - Terms specific to diseases and pathological conditions.<br>- Descriptive terms used in signs, symptoms, and diagnostic procedures.<br>- Common documentation phrases used in patient assessment and progress notes. | 4 |

| Unit No. | Content | Hours |
|---|---|---|
| **Unit V: Medical Documentation Essentials (Practical Component)** | - Writing and interpreting sample patient records, lab reports, and case summaries.<br>- Practice in decoding physician orders and medical chart entries.<br>- Exposure to electronic health record (EHR) terminology and formats. | 2 |

**Learning Outcomes**

Upon completion of the course, the student will be able to:

1. Construct and interpret medical terms accurately.
2. Decode abbreviations and symbols used in medical documentation.
3. Use medical terminology in professional communication with accuracy.
4. Interpret medical orders and reports from different specialties.
5. Demonstrate familiarity with documentation standards and electronic health records.

**Suggested Teaching Methods**

- Lectures and interactive discussions
- Flashcards and word-building exercises
- Case-based learning
- Practical documentation workshops
- Audio-visual aids and online EHR demos

**Recommended Textbooks**


1. Chabner, D. A. (2022). *The Language of Medicine*. Elsevier.
2. Ehrlich, A., & Schroeder, C. (2021). *Medical Terminology for Health Professions*. Cengage Learning.
3. Rice, J. A. (2020). *Medical Terminology: A Programmed Systems Approach*. Pearson.

## Second Semester:

**Community Health & Preventive Medicine**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Introduction & Concept of Health | 1 |
| 2 | Concept of Disease | 1 |
| 3 | Communicable Disease (Water-borne) | 1 |
| 4 | National Health Programmes – I | 1 |
| 5 | Communicable Disease (Contact-borne & Zoonoses) | 1 |
| 6 | Health Care Delivery System | 1 |
| 7 | Health Care of the Community | 1 |
| 8 | Occupational Health Control | 1 |
| 9 | National Health Programmes – II | 1 |
| 10 | Public Health Administration | 1 |
| 11 | Socio-cultural Factors in Disease | 1 |
| 12 | Health Education – I | 1 |
| 13 | Biostatistics | 2 |
| 14 | Nutrition Concepts | 1 |
| 15 | Fundamentals of Epidemiology | 1 |
| 16 | Scope of Epidemiology | 1 |
| 17 | Communicable Disease (Air-borne) | 1 |
| 18 | Communicable Disease (Vector-borne) | 1 |
| 19 | Occupational Health Hazards – I | 1 |
| 20 | Public Health Administration – Principles | 1 |
| 21 | Occupational Health Hazards – II | 1 |
| 22 | Occupational Health Control | 1 |
| 23 | RCH | 1 |
| 24 | IEC | 1 |
| 25 | Health Education – II | 1 |
| 26 | Research Methodology – I | 1 |
| 27 | Therapeutic Diet | 1 |

| Sl. No. | Topic | Hours |
|---|---|---|
| 28 | Health Education – III | 1 |
| 29 | Research Methodology – II | 1 |
| 30 | Visit to RHTC | 1 day |
| 31 | Visit to UHTC | 1 day |

**Total: 30 hours + 2 days visits**

## Behavioral Sciences & Clinical Psychology

**Total Hours:** 27 (Lecture: 20 | Practical / Tutorial: 7)

**Course Objectives**

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

1. Understand basic psychological principles relevant to healthcare and Respiratory Technology.
2. Recognize the relationship between mind and body in illness, recovery, and health behaviour.
3. Identify common psychological and behavioural responses in patients with respiratory diseases.
4. Develop skills in therapeutic communication, stress management, and counselling in respiratory care settings.
5. Apply psychological knowledge to promote patient compliance, motivation, and emotional well-being.

**Course Outline**

| Sl. No. | Topic | Topic Description | Hours |
|---|---|---|---|
| **1** | **Introduction to Psychology** | Definition, scope, and branches of psychology; relevance to healthcare and Respiratory Technology; behavioural medicine concepts. | 1 |
| **2** | **Biological Basis of Behavior** | Structure and function of the nervous system, brain–behavior relationships; influence of hypoxia, sleep, and respiratory distress on behaviour and cognition. | 1 |
| **3** | **Learning** | Principles of classical and operant conditioning; reinforcement; behaviour modification in smoking cessation, pulmonary rehabilitation, and adherence to therapy. | 3 |
| **4** | **Cognitive Learning** | Observational learning, motivation, and patient education strategies; promoting self-care and treatment adherence in chronic lung disease. | 3 |

| Sl. No. | Topic | Topic Description | Hours |
|---|---|---|---|
| **5** | **Memory** | Types of memory, forgetting, and recall; implications in patient education and rehabilitation programs. | 3 |
| **6** | **Thinking** | Problem-solving, clinical reasoning, and decision-making; cognitive biases in healthcare practice. | 3 |
| **7** | **Intelligence** | Measurement and types of intelligence; emotional intelligence and its role in therapeutic interactions and teamwork. | 2 |
| **8** | **Personality** | Major theories of personality; influence of personality traits on coping, compliance, and health behaviour. | 2 |
| **9** | **Mental Health** | Concepts of mental health and illness; psychological aspects of chronic respiratory disease, anxiety, and depression in COPD and sleep disorders. | 2 |
| **10** | **Stress** | Types and sources of stress; stress response; burnout among healthcare providers; stress management techniques for patients and professionals. | 2 |
| **11** | **Counselling** | Principles and techniques of counselling; patient-centred communication; counselling for lifestyle modification, anxiety, and end-of-life care. | 2 |
| **12** | **Communication** | Therapeutic communication skills, empathy, listening, and rapport building; handling difficult patients and families in respiratory care settings. | 2 |

**Learning Outcomes**

After successful completion of this course, the student will be able to:

1. Describe key concepts in psychology relevant to patient behaviour and motivation.
2. Apply psychological principles to improve communication and patient compliance in Respiratory Technology.
3. Recognize and address emotional and behavioural issues in respiratory patients.
4. Demonstrate basic counselling and stress management skills.
5. Promote holistic patient care integrating behavioural and psychological understanding.

**Teaching and Learning Methods**

1. Interactive lectures and discussions
2. Case-based learning (e.g., COPD anxiety, ventilator dependence)
3. Role plays and counselling practice sessions
4. Audio-visual presentations
5. Reflective journaling and group activities

**Recommended Textbooks**


1. Carson, R. C., Butcher, J. N., & Mineka, S. (2022). *Abnormal Psychology and Modern Life*. Pearson.
2. Sarason, I. G., & Sarason, B. R. (2020). *Psychology: The Science of Mind and Behavior*. Pearson.
3. Taylor, S. E. (2023). *Health Psychology*. McGraw Hill.
4. Seligman, M. E. P. (2021). *Positive Psychology in Clinical Practice*. APA Press.

## Medical Microbiology for Respiratory Technology

**Total Hours:** 45 (Theory: 30 | Practical / Demonstration: 15)

**Course Objectives**

By the end of this course, students will be able to:

1. Understand the basic principles of microbiology and its clinical relevance in respiratory care.
2. Describe the morphology, physiology, and pathogenic mechanisms of microorganisms causing respiratory and systemic infections.
3. Apply principles of sterilization, disinfection, and infection control in clinical and critical care environments.
4. Recognize the importance of immunity, antibiotic resistance, and hospital-acquired infections.
5. Perform basic microbiological procedures and adhere to infection control practices in respiratory care settings

**Course Outline**

| S. No. | Topic | Topic Description | Hours |
|---|---|---|---|
| **1** | **History of Microbiology** | Discovery of microorganisms, pioneers in microbiology, development of germ theory of disease, and contributions to respiratory medicine. | 1 |
| **2** | **Morphology & Physiology of Bacteria** | Classification, bacterial structure, growth, and reproduction; bacterial spores and significance in hospital sterilization. | 1 |
| **3** | **Sterilization & Disinfection** | Principles and methods of sterilization and disinfection; biosafety levels; infection control in Respiratory Technology equipment (ventilators, nebulizers, humidifiers). | 2 |
| **4** | **Normal Flora of Human Body** | Normal microbial flora of respiratory tract, skin, and mucosa; role in health and disease. | 1 |
| **5** | **Infection – Sources & Spread** | Chain of infection, modes of transmission, reservoirs; infection prevention and control (IPC) measures in hospitals. | 2 |
| **6** | **Hospital-acquired Infections (HAI)** | Types of HAIs, risk factors, and prevention; ventilator-associated pneumonia (VAP), catheter-associated infections; role of respiratory therapists in infection control. | 2 |

| S. No. | Topic | Topic Description | Hours |
|---|---|---|---|
| 7 | **Immunity (Specific & Non-specific)** | Components of innate and adaptive immunity; immune mechanisms in respiratory infections. | 1 |
| 8 | **Antigen–Antibody Reactions** | Basic serological tests and their clinical applications. | 1 |
| 9 | **Immune Response** | Primary and secondary immune responses; cellular and humoral immunity. | 1 |
| 10 | **Hypersensitivity & Allergy** | Types of hypersensitivity reactions; allergic asthma and immune-mediated airway diseases. | 1 |
| 11 | **Immunoprophylaxis** | Vaccines and immunization; BCG, influenza, COVID-19, pneumococcal vaccines in respiratory practice. | 1 |
| 12 | **Antibiotics** | Mechanism of action, resistance patterns, antibiotic stewardship, and implications in respiratory infections. | 1 |
| 13 | **Mycobacterium tuberculosis** | Pathogenesis, diagnosis, and prevention of tuberculosis; MDR-TB and DOTS strategy. | 1 |
| 14 | **General Properties of Viruses** | Structure, classification, and replication of viruses. | 1 |
| 15 | **Virus–Host Interactions** | Pathogenesis of viral infections; host response and latency. | 1 |
| 16 | **HIV/AIDS & STIs** | Pathogenesis, laboratory diagnosis, respiratory complications in HIV/AIDS, and infection control precautions. | 1 |
| 17 | **Medical Mycology** | Common fungal infections (Aspergillosis, Candidiasis) relevant to respiratory care. | 1 |
| 18 | **Medical Parasitology** | Overview of medically important parasites; respiratory manifestations of parasitic infections. | 1 |
| 19 | **Upper Respiratory Tract (URT) Infections** | Etiology, pathogenesis, and control of pharyngitis, tonsillitis, sinusitis, and otitis media. | 2 |
| 20 | **Lower Respiratory Tract (LRT) Infections** | Bacterial, viral, and fungal pneumonia; hospital-acquired pneumonia; respiratory syncytial virus (RSV), influenza, COVID-19; laboratory diagnosis and prevention. | 3 |

**Practical / Demonstration (15 Hours)**

| Activity | Description | Duration |
|---|---|---|
| **Gram Stain** | Demonstration and identification of Gram-positive and Gram-negative bacteria. | 1 hr |
| **Acid-Fast Stain** | Demonstration of Ziehl-Neelsen staining for *Mycobacterium tuberculosis*. | 1 hr |
| **Antibiotic Susceptibility Testing** | Kirby–Bauer disc diffusion method; interpretation of sensitivity patterns. | 1 hr |
| **Visit to CSSD / Microbiology Laboratory** | Observation of sterilization techniques, media preparation, and biosafety protocols. | 1 hr |
| **Bedside Infection Control Training** | Hands-on exposure to infection control practices in ICU, mechanical ventilation, and aerosol therapy settings (2 days). | Equivalent to 11 hrs |

**Learning Outcomes**

After successful completion of this course, the student will be able to:

1. Identify and describe major microorganisms responsible for respiratory and systemic infections.
2. Apply principles of sterilization, disinfection, and infection prevention in clinical practice.
3. Understand the immune response and its role in respiratory infections.
4. Demonstrate basic microbiological procedures.
5. Recognize and participate in hospital infection control and antibiotic stewardship programs.

**Teaching and Learning Methods**

1. Interactive lectures with visuals and case discussions
2. Microbiology laboratory demonstrations
3. Clinical visits (CSSD, ICU, Infection Control Unit)
4. Problem-based learning using respiratory infection case scenarios
5. Video demonstrations on sterilization and biosafety

**Recommended Textbooks**


1. Ananthanarayan, R., & Paniker, C. K. J. (2023). *Textbook of Microbiology*. Universities Press.
2. Brooks, G. F., Carroll, K. C., Butel, J. S., & Morse, S. A. (2022). *Jawetz, Melnick, & Adelberg's Medical Microbiology*. McGraw Hill.
3. Apurba S. Sastry & Sandhya Bhat (2022). *Essentials of Medical Microbiology*. Jaypee Brothers.
4. CDC Guidelines for *Infection Prevention and Control in Healthcare Settings* (latest update).

## PATIENT CONTACT TECHNIQUES

**Total Hours: Theory 42 + Practical 84 = 126 hours**

**Course Objectives**

Students will be able to:

1. Perform patient-centered contact and assessment safely and respectfully.
2. Take structured cardiopulmonary and comprehensive histories and recognize key symptoms.
3. Perform focused physical examinations and bedside cardiopulmonary assessments.
4. Apply infection control, airway clearance, BLS, and basic emergency measures in clinical practice.
5. Document patient encounters accurately and communicate effectively with team members and families.

**THEORY / UNIT TABLE**

| Unit No. | Patient Contact Techniques Topics (clinical emphasis) | Hours |
|---|---|---|
| 1 | Preparation for Patient Meeting — Individualized care: empathetic communication, privacy, cultural sensitivity; patient involvement (education, shared decision-making, family participation); provider collaboration (interprofessional communication & coordination). | 2 |
| 2 | Medical History & Interview — Principles of interview, structuring HPI, alternative sources; cardiopulmonary & comprehensive history (chief complaint, past medical, family, occupational, environmental); reviewing records (admission note, orders, DNAR/DNR); assessment standards for pulmonary dysfunction. | 2 |
| 3 | Cardiopulmonary Symptoms — Cough, sputum, hemoptysis, dyspnea, chest pain, syncope, edema, fever/chills, headache, altered mental status, snoring, GERD. | 2 |
| 4 | Vital Signs — Frequency & trending; height/weight; pain scale; sensorium; temp, pulse, respiration, blood pressure (including respiratory-cycle influence). | 2 |
| 5 | Fundamentals of Physical Examination — Head/neck/eyes; lung topography (surface markings, fissures); thorax inspection/palpation/percussion/auscultation; precordium; abdomen; extremity signs (clubbing, cyanosis, edema, hydration). | 2 |
| 6 | Neurologic Assessment — Functional neuroanatomy; consciousness scales (GCS, MMSE, ICU tools); cranial nerves; reflexes; coordination & gait; breathing & cardiovascular control; ancillary tests (imaging, EEG, LP, ICP); brain death & apnea test. | 2 |

| Unit No. | Patient Contact Techniques Topics (clinical emphasis) | Hours |
|---|---|---|
| 7 | Clinical Laboratory Studies — Phases of testing; blood composition; hematology (CBC, ESR, coagulation); chemistry (BMP, renal, liver, lipids, cardiac markers); microbiology specimens (sputum, BAL, pleural fluid); cytology/histology/skin tests. | 2 |
| 8 | Older Patient Assessment — Communication strategies, sensory deficits, organ aging, atypical presentations, comprehensive geriatric assessment, functional ability measures. | 2 |
| 9 | Documentation — Purposes & medicolegal aspects; organizing patient data; SOAP / APIE / PIP / SBAR; medical records & electronic documentation. | 2 |
| 10 | Principles of Infection Control — Standard & transmission-based precautions, hand hygiene, PPE, disinfection — importance in respiratory care. | 3 |
| 11 | Bronchial Hygiene Therapy (BHT) — Physiology of airway clearance, goals, indications (COPD, secretions). | 2 |
| 12 | Lung Expansion Therapy (LET) — Causes & types of atelectasis, clinical signs, chest physiotherapy adjuncts. | 2 |
| 13 | Chest Physical Therapy (CPT) — Indications, percussion/vibration techniques, monitoring. | 2 |
| 14 | Breathing Exercises — Diaphragmatic, pursed-lip breathing; program design (intensity, frequency, duration). | 1 |
| 15 | Postural Drainage Therapy — Principles, positions, indications & contraindications. | 1 |
| 16 | Airway Clearance Techniques — Suctioning (oral, nasopharyngeal, endotracheal), catheter selection & handling. | 1 |
| 17 | Basic Life Support (BLS) — Adult (theory, algorithms). | 2 |
| 18 | Basic Life Support (BLS) — Pediatric (theory, algorithms). | 2 |
| 19 | Foreign Body Airway Obstruction — Recognition & management (Heimlich, back blows). | 1 |
| 20 | Infant Basic Life Support — Infant CPR and choking management basics. | 1 |
| 21 | Applied Aspects of Anatomy & Physiology of Lungs — focused revision and clinical correlation for bedside practice. | 2 |
| 22 | Basic Life Support (BLS) — Adult (additional/refresher/practical integration). | 2 |
| 23 | Basic Life Support (BLS) — Pediatric (additional/refresher/practical integration). | 2 |

**Total Theory Hours:42**

Note: Units 17/22 (Adult BLS) and 18/23 (Pediatric BLS) are listed twice in your original content — I retained both entries as theory/refresher integration. If you prefer to merge duplicates into single extended practical modules, I can condense.

**PRACTICAL / SKILLS SESSIONS**

| Sl. No. | Topics Covered (Practical skills & simulation) | Hours |
|---|---|---|
| 1 | Medical history taking, patient interview, reviewing medical records (structured & role-play). | 6 |
| 2 | Assessment of cardiopulmonary symptoms (case-based bedside evaluation). | 6 |
| 3 | Basic patient assessment & vital signs (BP, pulse, RR, temp, pain scales, sensorium). | 6 |
| 4 | Clinical exam: inspection, palpation, percussion, auscultation (lungs & heart practice). | 6 |
| 5 | Neurologic assessment (GCS, cranial nerves, reflexes, coordination). | 6 |
| 6 | Clinical laboratory specimen handling & interpretation (sputum, blood, BAL, pleural fluid basics). | 6 |
| 7 | Documentation & goal setting (SOAP notes, SBAR handover, case charts). | 6 |
| 8 | Bedside patient assessment — bedside rounds, case presentation practice. | 2 |
| 9 | Infection control practices — hand hygiene, PPE, isolation precautions, disinfection drills. | 4 |
| 10 | Bronchial hygiene therapy (BHT) — device demos, assisted coughing, monitoring secretions. | 4 |
| 11 | Lung expansion therapy (LET) — incentive spirometry, IPPB demo, monitoring. | 4 |
| 12 | Chest physical therapy (CPT) — percussion, vibration, positioning practice. | 4 |
| 13 | Breathing exercises — diaphragmatic, pursed-lip breathing practice & program design. | 2 |
| 14 | Postural drainage therapy — positioning practice & contraindications. | 2 |
| 15 | Airway clearance techniques — suctioning practice (oral, nasopharyngeal, ET tube). | 4 |
| 16 | BLS — Adult CPR manikin practice (compressions, ventilation, AED use). | 4 |
| 17 | BLS — Pediatric CPR manikin practice (age-appropriate technique). | 4 |

| Sl. No. | Topics Covered (Practical skills & simulation) | Hours |
|---|---|---|
| 18 | Foreign body airway obstruction — Heimlich & simulation drills. | 2 |
| 19 | Infant BLS — infant CPR & choking management practice. | 4 |
| 20 | Bedside rounds, case presentations (summative practical assessment). | 2 |

**Total Practical Hours:84**

**Learning Outcomes**

After completion, the student will be able to:

- Conduct safe, respectful, and effective patient encounters and history-taking.
- Recognize and prioritize cardiopulmonary symptoms warranting urgent action.
- Perform systematic physical exams of chest and cardiovascular system and document findings.
- Implement infection control, airway clearance, and BLS procedures competently.
- Communicate and handover patient care using structured formats (SBAR, SOAP).

## APPLIED PATHOLOGY

**Total Hours: Lecture 30 + Demonstration 6 = 36 hours**

**Course Objectives**

Students will be able to:

1. Describe basic mechanisms of cell injury, inflammation, hemostasis and repair.
2. Recognize pathological processes relevant to respiratory and systemic diseases.
3. Correlate pathological changes with clinical presentations and diagnostic tests.
4. Interpret basic pathology slides and understand laboratory/pathology reports.

| Sl No | Topic (key points) | Hours |
|---|---|---|
| 1 | **Introduction to Pathology & Terminology** — Cell injury (reversible/irreversible), adaptations, intracellular accumulations, pathological calcification. | 2 |
| 2 | **Inflammation & Tissue Repair** — Acute inflammation: signs, vascular events, cellular events, purpose & classification; steps of tissue repair. | 3 |
| 3 | **Haemostasis, Coagulation & Thrombosis** — Edema, congestion, hemorrhage, embolism, infarction, shock. | 4 |
| 4 | **Nutrition & Infectious Diseases** — PEM, vitamin deficiency states; etiopathogenesis of bacterial (TB, leprosy, typhoid), viral (eg. dengue), fungal & protozoal infections (malaria, amoebiasis). | 3 |
| 5 | **Neoplasia & Tumor Pathology** — Classification, growth rate, local invasion, metastasis pathways, carcinogens, oncogenic viruses, benign vs malignant, paraneoplastic syndromes, tumor markers. | 4 |
| 6 | **Cardiovascular Pathology** — IHD pathogenesis & complications, hypertension pathology, aneurysm types, rheumatic heart disease, infective endocarditis, overview of congenital heart diseases. | 3 |
| 7 | **Respiratory Pathology** — Pneumonia (pathogenesis & complications), tuberculosis, COPD pathogenesis & complications, types of lung tumors. | 3 |
| 8 | **Gastrointestinal & Genitourinary Pathology** — Peptic ulcer disease, gastric & colorectal carcinoma morphology, viral hepatitis, alcoholic liver disease & cirrhosis; renal pathology overview (glomerular, tubular, vascular disease), renal stones, urinary tract tumors. | 8 |

**Total Lecture Hours:30**

**Demonstration / Practical**

- Demonstration of histology slides & laboratory visit. **6 hours**

**Total Module Hours:36**

**Learning Outcomes**

- Explain fundamental pathological mechanisms (injury, inflammation, repair, hemostasis).
- Identify pathological features of major organ systems, with emphasis on respiratory pathology (TB, pneumonia, COPD, lung tumors).
- Relate pathology to clinical diagnostics and management.

## GENERAL & APPLIED PHARMACOLOGY

**Total Hours: Lecture 30 + Demonstrations (suggested 6) = 36 hours**

**Course Objectives**

Students will be able to:

1. Understand basic pharmacological principles, drug actions, ADME, adverse drug reactions.
2. Describe pharmacology of major drug classes used in respiratory, cardiovascular, CNS, renal and infectious disease management.
3. Interpret prescriptions, calculate doses, and understand drug interactions and side effects relevant to respiratory care.

| Sl. No | Topics (highlights) | Hours |
|---|---|---|
| 1 | **General Pharmacology** — Definitions, sources, routes, drug delivery, formulation, absorption, bioavailability, biotransformation, excretion, drug targets, factors influencing drug action, ADR types. | 4 |
| 2 | **Autonomic Nervous System Pharmacology** — Parasympathetic vs sympathetic; cholinergic drugs, anti-cholinesterases, anticholinergics, adrenergics; α/β blockers and clinical uses. | 4 |
| 3 | **Drugs Acting on the Kidney** — Diuretics: sites of action, uses, adverse effects; ADH and antagonists. | 2 |
| 4 | **Cardiovascular Drugs** — Antihypertensives, antiarrhythmics, drugs for heart failure, antianginal agents. | 2 |
| 5 | **Central Nervous System Drugs** — General & local anesthetics, sedatives/hypnotics, alcohols, antiepileptics, opioids (mechanism, uses, toxicity). | 4 |
| 6 | **Autacoids & Respiratory Drugs** — Antihistamines, NSAIDs; cough remedies; bronchodilators, anti-asthma drugs (mechanisms & ADRs); GI drugs (antiemetics, antiulcer). | 4 |
| 7 | **Blood & Hormones** — Hematinics, anticoagulants, antiplatelets, fibrinolytics, hypolipidemics; insulin & oral hypoglycemics, antithyroid drugs. | 4 |
| 8 | **Chemotherapy** — Antimicrobials (classification & resistance), major antibiotic classes (penicillins, cephalosporins, macrolides, aminoglycosides, fluoroquinolones), anti-TB drugs, antivirals, antifungals, antimalarials, antihelminthics, cancer chemotherapy basics. | 6 |

**Total Lecture Hours:30**

**Demonstration / Practical (suggested items)**

1. Prescription writing & interpretation (relevance to respiratory care)
2. Experimental pharmacology demonstration (drug effects on models)
3. Dose calculation exercises and chart interpretation
4. Practical demonstrations on common drug administration techniques

**Suggested Practical Hours:6** (adjust as needed)

**Learning Outcomes**

- Describe pharmacodynamics and pharmacokinetics fundamentals.
- Discuss pharmacotherapy for respiratory conditions (bronchodilators, steroids, antibiotics, anti-TB regimens).
- Safely interpret and write prescriptions, and calculate drug dosages.

## Pulmonary Diseases – I

**Total Hours: Lecture 12 + Practical 34 = 46 hours**

**Course Objectives**

Students will be able to:

1. Understand pathology, clinical presentation, diagnosis and management principles of common respiratory diseases.
2. Correlate imaging, laboratory and histopathology findings with clinical cases.
3. Participate in case-based reviews and bedside management discussions of respiratory pathologies.

**Lecture Topics (Total 12 hours)**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Bronchitis & Bronchiectasis | 1 |
| 2 | Pulmonary Embolism | 1 |
| 3 | Lung Cancer & Lung Abscess | 1 |
| 4 | Pneumonia (Community Acquired) | 1 |
| 5 | Pneumonia (Hospital Acquired) | 1 |
| 6 | COPD | 1 |
| 7 | Pneumothorax | 1 |
| 8 | Pleural Diseases & Pleural Effusion | 1 |
| 9 | Pulmonary Edema & Management | 1 |
| 10 | ARDS / SARS | 1 |
| 11 | Toxic Inhalation & Smoke Injury | 1 |
| 12 | Acute Respiratory Failure | 1 |

**Total Lecture Hours:12** (1 hour each)

**Practical / Clinical Demonstrations (Total 34 hours)**

| Sl. No. | Practical Component | Hours |
|---|---|---|
| 1 | Case discussions: Bronchitis, Bronchiectasis | 2 |
| 2 | Case-based discussion: Pulmonary Embolism | 2 |
| 3 | Lung cancer work-up (radiology, cytology/histopathology) | 2 |
| 4 | Case review: Lung abscess | 2 |
| 5 | Community-acquired pneumonia — bedside case & X-ray findings | 2 |
| 6 | Hospital-acquired pneumonia — ICU case, sputum culture discussion | 2 |
| 7 | COPD bedside assessment & spirometry demonstration | 4 |
| 8 | Pneumothorax — chest X-ray & management techniques (needle decompression/chest tube demo) | 2 |

| Sl. No. | Practical Component | Hours |
|---|---|---|
| 9 | Pleural effusion — tapping (thoracentesis), fluid analysis, ultrasound demo | 4 |
| 10 | Pulmonary edema — case analysis, echocardiography correlation, diuretic therapy discussion | 2 |
| 11 | ARDS / SARS — case presentation & ventilator management demo | 4 |
| 12 | Toxic inhalation / smoke injury — emergency response simulation | 2 |
| 13 | Acute respiratory failure — bedside case + ABG interpretation & ABG-driven treatment | 4 |

**Total Practical Hours:34**

**Course Credit Allocation**

- **Lecture (theory):** 12 hours → 1 Credit
- **Practical / Clinical:** 34 hours → 3 Credits
- **Total:** 46 hours → **4 Credits**

**Learning Outcomes**

- Diagnose and differentiate common respiratory diseases using history, clinical exam, imaging, and lab data.
- Demonstrate bedside skills for pleural procedures, chest tube management, and basic emergency interventions.
- Interpret ABGs, spirometry, and radiology relevant to respiratory pathology and guide immediate management decisions.

## Fundamentals of Respiratory Care (Theory & Practical)

Semester hours (15 weeks): **Total = 90 hours**

- Lecture hours (L) = **45**
- Tutorial hours (T) = **15**
- Practical hours (P) = **15**
- Clinical / Bedside hours (CL) = **15**

### Course Description

Introductory course covering the core, day-to-day clinical skills and knowledge required of a respiratory therapist: patient assessment, oxygen and aerosol therapy, airway care and suctioning, humidification, basic ventilatory support including NIV, monitoring and bedside investigations, infection control, emergency response and documentation. Strong emphasis on hands-on skills, simulation and bedside clinical exposure.

### Course Objectives

By the end of the course the student will be able to:

1. Perform structured cardiopulmonary assessment and interpret basic investigations.
2. Deliver safe oxygen therapy, humidification and aerosol therapy using common devices.
3. Perform airway care including suctioning and tracheostomy maintenance.
4. Initiate and manage basic non-invasive ventilatory support and understand indications for invasive ventilation.
5. Monitor respiratory patients ($SpO_2$, capnography basics, ABG interpretation) and respond to common emergencies (BLS).
6. Apply infection control, equipment care and accurate documentation in respiratory practice.

**Unit-wise Topic Breakdown (total hours shown)**

(Units sum to 90 hours — you can reassign hours across weeks if needed.)

| Unit No. | Topic | Hours |
|---|---|---|
| 1 | Cylinders, Pressure regulators Flow meters, Bourdon Guage manometers | 8 |
| 2 | **Oxygen Therapy** — Oxygen sources, flowmeters, concentrators, cylinders, low-flow vs high-flow systems, nasal cannulae, simple mask, non-rebreather, HFNO principles, humidified oxygen, safety. | 10 |
| 3 | **Airway Management & Artificial Airways** — Oropharyngeal/nasopharyngeal airways, endotracheal tube basics, tracheostomy tube types & care, cuff care, tube fixation, extubation basics. | 8 |
| 4 | **Suctioning & Airway Clearance** — Indications, equipment, open vs closed suction, catheter selection, infection prevention; assisted cough, huff/cough techniques. | 6 |
| 5 | **Aerosol Therapy & Humidification** — pMDI, spacer technique, DPI, jet/ultrasonic/nebulizers, aerosol particle concepts, heated humidifiers, HME, humidification for ventilated patients. | 6 |
| 6 | **Non-invasive Ventilation (NIV) & CPAP** — Indications, interfaces, ventilator types, setup & monitoring, basic troubleshooting, patient selection, complications. | 6 |
| 7 | Manual Resuscitators, Oxygen Monitors, Flow sensors | 6 |
| 8 | **Monitoring & Bedside Investigations** — Pulse oximetry, capnography basics, ABG sampling & interpretation, chest x-ray basics for RT, basic PFT/Spirometry demo. | 8 |
| 9 | **Chest Physiotherapy & Lung Expansion** — Postural drainage, percussion, vibration, incentive spirometry, IPPB basics, lung recruitment principles. | 8 |
| 10 | **Infection Control & Equipment Care** — Standard & transmission-based precautions, PPE, disinfection/sterilization of circuits & devices, CSSD basics, biomedical waste. | 4 |
| 11 | Capnography, Pulse oximeters, Transcutaneous monitoring | 8 |
| 12 | **Documentation, Communication & Ethics** — Charting (SOAP, SBAR), handover, medico-legal aspects, patient education, family communication and discharge planning. | 6 |

**Total:90 hours**

**Practicals & Clinical (15 P + 15 CL hours = 30 hours)**

(These are to be scheduled as hands-on lab + supervised bedside slots.)

Key practical skill sessions (each 1–4 hrs; total P = 15 hrs):

- Device familiarization: flowmeters, oxygen delivery devices, HFNO, humidifiers (2 hrs)
- Nebulizer/MDI/DPI technique practice and spacer demonstration (2 hrs)
- Suctioning practice on manikin (open & closed systems) and ET tube suction simulation (2 hrs)
- Tracheostomy care and humidification for tracheostomy (1.5 hrs)
- Spirometry and basic PFT demo (1.5 hrs)
- ABG sampling practice (arterial puncture simulation / practice with tutor, if allowed) and sample handling (2 hrs)
- Pulse oximetry and capnography monitoring lab (1 hr)
- BLS manikin practice (adult/pediatric/infant) and choking drill (2 hrs)
- Basic NIV/CPAP setup on trainer (1 hr)

Clinical / Bedside (CL = 15 hrs) — supervised ward/ICU exposure:

- Bedside oxygen therapy & monitoring (3 hrs)
- Suctioning & airway clearance on real patients under supervision (3 hrs)
- Tracheostomy dressing & suctioning bedside (2 hrs)
- Participation in rounds — charting & SBAR handover practice (2 hrs)
- ABG sample collection & immediate interpretation with mentor (2 hrs)
- NIV/CPAP application, mask fitting & monitoring in ward/HDU (3 hrs)

Note: ABG sample collection on patients may be restricted by institutional policies — ensure students practice on simulation models or under direct clinician supervision per hospital rules.

**Suggested Textbooks & References**


1. MacIntyre NR, et al. *Respiratory Care: Principles and Practice*. Elsevier.
2. Tobin MJ (ed). *Principles and Practice of Mechanical Ventilation*. McGraw-Hill (for the fundamentals chapter).
3. Hess DR. *Aerosol Therapy: Devices, Delivery & Clinical Application*. Respiratory Care.
4. Kacmarek RM, Stoller JK, Heuer AJ. *Egan's Fundamentals of Respiratory Care*. Elsevier. (very practical)
5. AHA Basic Life Support Provider Manual (latest edition).
6. Hospital/institute infection control policy; manufacturer manuals for ventilators and NIV devices.

## FOURTH SEMESTER

**Pulmonary Diseases II**
**Total Lecture Hours: 15**

**Course Objectives**
Students will be able to:

1. Describe pathology and clinical features of a wide spectrum of respiratory and related systemic conditions.
2. Correlate pathophysiology with clinical presentation, investigations and basic management priorities.
3. Recognize occupational, toxic, neurologic and disaster-related respiratory problems.

**Lecture Topics**

| S. No. | Topic | Duration |
|---|---|---|
| 1 | Viral and fungal lower respiratory tract infections | 1 hr |
| 2 | Upper respiratory tract infections | 1 hr |
| 3 | Occupational lung disease | 1 hr |
| 4 | Sleep disorders | 1 hr |
| 5 | Asthma | 1 hr |
| 6 | Pulmonary hypertension | 1 hr |
| 7 | Flail chest, mediastinal & chest wall diseases | 1 hr |
| 8 | Dyspnea and its management | 1 hr |
| 9 | Myasthenia gravis & Guillain–Barré syndrome (respiratory implications) | 1 hr |
| 10 | Snake bite, poisoning, hanging, tetanus (respiratory effects) | 1 hr |
| 11 | Restrictive lung disorders | 2 hrs |
| 12 | Near drowning | 1 hr |
| 13 | Poisoning and burn injury (respiratory complications) | 2 hrs |

**Total Lecture Hours:15,**

**Practical: Case discussion for each topic (2 hrs.) which will be a total of 30 hrs.**

**Learning Outcomes**

- Explain pathogenesis and complications of listed respiratory diseases.
- Identify red flags and basic acute management principles for toxic, neurologic and airway-compromising conditions.
- Correlate disease processes with diagnostic approaches in respiratory pathology.

## Diagnostic & Therapeutic Procedures in Respiratory Care (T&P)

**Total Hours (Theory + Practical):** 41 (Theory 31 + Practical/Demonstration 10)

**Course Objectives**

Students will be able to:

1. Understand principles, indications and interpretation of common cardiopulmonary diagnostic techniques.
2. Perform/assist safely in bedside and laboratory diagnostics relevant to respiratory care.
3. Interpret ECGs, ABGs, PFTs and basic imaging for integration into clinical decision-making.

**Theory Topics**

| No. | Topic | Hours |
|---|---|---|
| 1 | Electrical conduction system of the heart | 1 |
| 2 | Normal ECG & lead placement (12-lead standardization) | 1 |
| 3 | Cardiac arrhythmias I — sinus arrhythmia, bradycardia, tachycardia, AF/flutter | 1 |
| 4 | Cardiac arrhythmias II — PACs, junctional rhythms, ventricular arrhythmias, VF/MI | 1 |
| 5 | Factors affecting cardiac output — preload, afterload, contractility, SVR | 1 |
| 6 | Central venous catheterization — routes, indications, interpretation of CVP data | 1 |
| 7 | Pulmonary artery catheterization — technique and data interpretation | 1 |
| 8 | Arterial line insertion & ABP monitoring — sites, sampling, procedure | 2 |
| 9 | Bedside assessment of pulmonary function — spirometry basics, V–T, V–F, P–V studies | 1 |
| 10 | Imaging studies — chest X-ray views, interpretation method, limitations | 4 |
| 11 | Intro to pulmonary diseases on chest radiograph — atelectasis, pneumothorax, pneumonia, TB, pulmonary edema, COPD, restrictive disease | 2 |
| 12 | Blood gas analysis — ABG interpretation: oxygenation, ventilation, acid–base | 3 |
| 13 | Introduction to PFT lab — spirometer history, instrumentation, calibration, infection control, ATPS/BTPS | 4 |
| 14 | Pulmonary function studies — volumes, flows, lung volumes, bronchodilator testing | 4 |
| 15 | Interpretation of PFT data | 2 |

**Theory Hours Total:31**

**Practical / Demonstration**

- Demonstration & practical sessions (principles of blood gas analysis, PFT demonstrations, chest X-ray review, arterial line/ABP monitoring demo, ECG practice, spirometry & body plethysmography demos). **10 hours**

**Additional Topic Subsections (linked to ABG and physiology)**

| S. No. | Topic | Hours |
|---|---|---|
| 1 | Basic physical & physiological principles (gas exchange, transport) | 2 |
| 2 | Hydrogen ion regulation in fluids | 1 |
| 3 | Oxygen transport & measurement of oxygen content | 1 |
| 4 | Acid–base balance & clinical approach to disturbances | 2 |
| 5 | Quality control in sampling & calibration | 1 |
| 6 | Correction factors in blood gas analysis | 1 |
| 7 | Measurement of hemoglobin & saturation | 1 |

(These are included within the ABG/PFT and demo block above.)

**Total Course Hours:41** (31 theory + 10 practical)

**Learning Outcomes**

- Acquire competence in ABG sampling/interpretation and basic PFT interpretation.
- Read and interpret common chest radiograph findings relevant to respiratory disease.
- Recognize and respond to common ECG abnormalities and arterial/central venous monitoring data.

## Principles of Mechanical Ventilation – I (T&P)

### MECHANICAL VENTILATION

**I (THEORY & PRACTICAL)**

**Total Hours:** 26 (Theory 16 + Practical/Demo 10)

**Course Objectives**

Students will be able to:

1. Understand principles, indications and physiological effects of mechanical ventilation.
2. Initiate and adjust ventilator settings safely under supervision and monitor responses.
3. Recognize complications and heart–lung interactions during positive pressure ventilation.

**Theory Topics**

| S. No. | Topic | Hours |
|---|---|---|
| 1 | History of mechanical ventilation | 1 |
| 2 | Negative pressure ventilation (overview) | (integrated within history/physical principles) |
| 3 | Physical principles of mechanical ventilation: power, drive, variables, pressure/flow generators, circuits | 4 |
| 4 | Physiological effects of positive pressure ventilation (PPV), complications & minimization strategies | 2 |
| 5 | Respiratory failure and indications for MV — Type I/II RF, assessment of respiratory fatigue/work of breathing | 3 |
| 6 | Indication & assessment for artificial ventilation | 1 |
| 7 | Initiating & adjusting ventilator settings (initial settings, oxygenation targets) | 2 |
| 8 | Selecting ventilator & mode — full/partial support, targeting control variables, closed-loop strategies | 4 |
| 9 | Heart–lung interactions during MV | 1 |
| 10 | Monitoring in mechanical ventilation — airway pressures, compliance, resistance, airway management | 2 |
| 11 | Non-invasive assessment of respiratory function (indirect calorimetry, respiratory mechanics) | 2 |

**Practical / Demonstration**

- Demonstration & hands-on practical: ventilator setup, modes, patient simulation, monitoring, troubleshooting and applied exercises. **10 hours**

**Suggested Credit Allocation:** Theory 3 + Practical 1 → **4 Credits**

**Learning Outcomes**

- Explain ventilator hardware and control variables.
- Initiate basic ventilator support and titrate settings for oxygenation/ventilation goals.
- Monitor ventilator patients and troubleshoot alarms/complications.

## APPLIED CARDIOPULMONARY ANATOMY & PHYSIOLOGY

**Total Hours:** 24 (theory — 1 hr units as listed; plus 1-hr practicals integrated)

**Course Objectives**

Students will be able to:

1. Revise and apply anatomy and physiology relevant to respiratory and cardiopulmonary care.
2. Integrate physiologic principles with monitoring, diagnostics and bedside procedures.

| S. No. | Topic area | Lecture topic | Hours |
|---|---|---|---|
| **Anatomy of Respiration & Airways** | | | **8** |
| 1 | Anatomy of respiration | Overview | 1 |
| 2 | The respiratory tract | Structure & divisions | 1 |
| 3 | Conducting vs respiratory zone | Differences & functions | 1 |
| 4 | Respiratory epithelium & mucosa | Histology & function | 1 |
| 5 | Upper respiratory tract | Nose, pharynx, larynx | 1 |
| 6 | Lower respiratory tract | Trachea, bronchi, bronchioles, alveoli | 1 |
| 7 | Blood supply of lungs | Pulmonary & bronchial circulation | 1 |
| 8 | Muscles of respiration | Diaphragm, intercostals, accessory muscles | 1 |
| **Physiology of the Respiratory System** | | | **6** |
| 9 | Mechanics of breathing | Pressures, compliance, resistance | 1 |
| 10 | Physiology of gas exchange | Diffusion, partial pressures, membrane factors | 1 |
| 11 | Respiratory volumes & capacities | Tidal, vital, residual volumes; spirometry | 1 |
| 12 | Respiratory sounds | Normal & abnormal auscultation findings | 1 |
| 13 | External & internal respiration, gas transport | $O_2$/$CO_2$ transport, hemoglobin role | 1 |
| 14 | Control of respiration | Central & peripheral chemoreceptors, neural control | 1 |

| S. No. | Topic area | Lecture topic | Hours |
|---|---|---|---|
| **Cardiovascular (Applied)** | | | **10** |
| 15 | Anatomy of heart | Gross structure, chambers, valves | 1 |
| 16 | Conduction system | SA/AV nodes, bundle branches | 1 |
| 17 | Blood vessels & circulation | Arteries, veins, capillaries, microcirculation | 1 |
| 18 | Cardiac cycle | Phases, heart sounds, pressure changes | 1 |
| 19 | Valve function | Valve mechanics & clinical relevance | 1 |
| 20 | Electrical activity & ECG basics | Electrical vectors, lead basics | 1 |
| 21 | Cardiac output | Determinants, measurement concepts | 1 |
| 22 | Coronary circulation | Coronary arteries, ischemia basics | 1 |
| 23 | Systemic circulation | Peripheral resistance, distribution of flow | 1 |
| 24 | Pulmonary circulation | Pulmonary vascular physiology, V/Q relations | 1 |
| **Total Hours** | | | **24** |

**Practical / Demonstration**

- One hour practical/discussion for many pulmonary rehabilitation topics is noted separately in Semester 6; for this module, integrate bedside anatomy review, chest auscultation labs and waveform correlation sessions (suggest 4–8 practical hours as local program requires).

**Learning Outcomes**

- Correlate anatomical structures with physiological function and clinical signs.
- Interpret auscultation findings and relate to lung pathology and ventilator settings.
- Use applied physiology to guide basic respiratory interventions.

## FIFTH SEMESTER

### BIOSTATISTICS, ETHICS & PROFESSIONALISM

**Total Hours:** 22

**Course Objectives**

Students will be able to:

1. Understand medico-legal and ethical aspects of healthcare and respiratory practice.
2. Apply basic biostatistics for data handling, interpretation and simple research design.
3. Use standard computer tools for documentation, presentation and data processing.

**Topics & Hours**

| S. No. | Topic | Detailed Sub-topics Covered | Hours |
|---|---|---|---|
| 1 | Medical ethics & medico-legal aspects | Principles of ethics (autonomy, beneficence, non-maleficence, justice); patient rights; confidentiality; consent; documentation; medico-legal responsibilities; Consumer Protection Act; reporting obligations | 3 |
| 2 | Ethical & legal implications in respiratory care | Scope of practice; accountability (NCAHP guidelines); ethical dilemmas in respiratory therapy; NIV/MV ethics; DNR/End-of-life decisions; legal implications of RT procedures (ABG, airway care, suctioning) | 2 |
| 3 | Basics of computer applications | Windows basics; MS Word formatting; MS Excel data entry & formulas; MS PowerPoint presentations; simple data processing & documentation tools | 1 |
| 4 | Basics of medical statistics | Types of data; descriptive statistics (mean, SD); sampling; inferential statistics; hypothesis testing; Chi-square test; t-test; data graphs & tables; interpretation of p-value & CI | 4 |
| 5 | Role of statistics in health sciences & research | Importance of statistics; incidence & prevalence; study designs; sampling; hypothesis testing; reliability & validity; correlation; basic data analysis; interpretation of research | 8 |

| S. No. | Topic | Detailed Sub-topics Covered | Hours |
|---|---|---|---|
| 6 | Scientific writing & documentation | Structure of protocol & thesis; IMRaD format; referencing (Vancouver/APA); journal writing; introduction to systematic reviews & meta-analysis; PRISMA/CONSORT basics | 1 |
| 7 | Epidemiology basics | Disease occurrence; risk factors; transmission; outbreak investigation; screening (sensitivity & specificity) | 1 |
| 8 | Biomedical waste management | Categories of waste; segregation & colour coding; infection control; PPE; disposal standards; legal regulations | 1 |
| 9 | Electricity & electro-medical equipment safety | Basics of electricity; grounding; shock hazards; leakage current; ventilator/monitor/HFNC safety; preventive maintenance; ICU equipment safety | 2 |
| 10 | ICU structure & functions introduction | ICU layout; zones; equipment overview; RT roles; ICU workflow; rounds; handover protocol; safety practices | 1 |

**Total Hours:24** (minor rounding acceptable per institutional norms)

**Learning Outcomes**

- Apply basic statistical concepts in clinical data interpretation.
- Demonstrate ethical decision-making and medicolegal awareness in clinical practice.
- Prepare basic scientific documents and use office applications for presentations and data.

## Critical Care & Advanced Cardiothoracic Respiratory Care (with ACLS)

**Total Theory Hours:** 30 (as listed)

**Topics & Hours**

| No. | Topic | Hours |
|---|---|---|
| **1** | Shock (hypovolaemic, cardiogenic, septic) — pathophysiology & inotropes/vasopressors | 2 |
| **2** | Intercostal drainage tubes — technique & management | 2 |
| **3** | Chest trauma management in ICU | 1 |
| **4** | ACLS (advanced cardiac life support) — CPR, advanced airway, arrhythmia management, drugs, post-resuscitation care | 5 |
| **5** | Major adult cardiac disorders & ventilator concepts | 2 |
| **6** | Major pediatric cardiac disorders (post-op care, ventilator management) | 4 |
| **7** | General pediatric disorders requiring ventilation | 1 |
| **8** | Neurological disorders — ventilatory implications | 1 |
| **9** | MV in congestive heart failure | 1 |
| **10** | Stroke — respiratory care considerations | 1 |
| **11** | Renal failure & hemodialysis (ventilator implications) | 1 |
| **12** | Respiratory defense mechanisms | 1 |
| **13** | Prone ventilation | 3 |
| **14** | Liquid ventilation & ECMO (intro) | 1 |
| **15** | Bronchoscopy Part 1 | 2 |
| **16** | Sedation & paralysis in mechanically ventilated patients | 1 |
| **17** | Ventilator associated pneumonia (VAP) — prevention & management | 1 |

**Total Theory Hours:30**

**Learning Outcomes**

- Manage critical cardiothoracic emergencies and support advanced resuscitation measures.
- Understand ICU-level ventilator strategies for cardiac and neuro patients.
- Participate in bronchoscopy assistance and VAP prevention strategies.

## NEONATAL AND PAEDIATRIC RESPIRATORY CARE

**Total Hours:** 28

**Course Objectives**

Students will be able to:

1. Understand neonatal cardiorespiratory anatomy, physiology and special care needs.
2. Implement neonatal respiratory support strategies including CPAP, HFOV and surfactant therapy.
3. Provide neonatal resuscitation and manage neonatal ventilatory emergencies.

**Topics & Hours**

| No. | Topic | Hours |
|---|---|---|
| **1** | Neonatal cardiorespiratory anatomy & physiology | 2 |
| **2** | Thermoregulation in newborn | 2 |
| **3** | Fetal circulation | 2 |
| **4** | Neonatal respiratory disorders overview | 2 |
| **5** | Assessment of oxygenation & ventilation in neonates | 2 |
| **6** | Oxygen therapy in neonates | 2 |
| **7** | CPAP & advanced technologies | 2 |
| **8** | Initiation of mechanical ventilation & airway management in neonates | 4 |
| **9** | HFOV & HFV in neonates (initiation, monitoring, adjustment, wean-back) | 3 |
| **10** | Weaning & extubation in neonates | 2 |
| **11** | Surfactant replacement therapy | 1 |
| **12** | Hyaline membrane disease / RDS | 2 |
| **13** | Periodic breathing & neonatal apnea | 1 |
| **14** | Bronchopulmonary dysplasia, transient tachypnea of newborn | 1 |
| **15** | Neonatal resuscitation (NRP principles) | 2 |

**Total Hours:30**

**Learning Outcomes**

- Identify neonatal respiratory pathologies and initiate age-appropriate respiratory support.
- Perform neonatal resuscitation and manage ventilator strategies specific to neonates.
- Monitor and adjust HFOV/HFV and interpret neonatal respiratory parameters.

## SIXTH SEMESTER

**Principles of Mechanical Ventilation – II (T&P)**

**MECHANICAL VENTILATION II**

**Total Hours:** ~38 (theory + demos/practicals as listed)

**Course Objectives**

Students will be able to:

1. Manage advanced monitoring, modes and disease-specific applications of mechanical ventilation.
2. Apply protective strategies, recruitment maneuvers, weaning protocols and complication management.
3. Understand NIV, pediatric NIV, home ventilation and medico-legal/ethical aspects of assisted ventilation.

**Topics & Hours**

| S. No. | Topic | Hours |
|---|---|---|
| **1** | Monitoring in mechanical ventilation — capnography, $SpO_2$, airway pressures, chest inspection, blood gases, transcutaneous monitoring | 2 |
| **2** | Hemodynamic monitoring — arterial line, CVP, PA catheter, PCWP, cardiac output, $SvO_2$ interpretation | 2 |
| **3** | Modes of ventilation (conventional, dual control, APRV, NAVA, BiLevel) | 2 |
| **4** | PEEP therapy principles | 2 |
| **5** | Ventilator graphics & waveform analysis (volume/flow/pressure loops) | 3 |
| **6** | Managing the ventilated patient — troubleshooting, optimization, fluid/electrolyte/nutrition considerations | 2 |
| **7** | Protective lung ventilation strategies | 2 |
| **8** | Lung recruitment strategies | 2 |
| **9** | Pathophysiology & management (disease-specific) | 2 |
| **10** | Disease-specific applications (ARDS, COPD, NMD, CHF, ILD etc.) | 4 |
| **11** | Independent lung ventilation | 1 |
| **12** | Percutaneous dilatational tracheostomy (PDT) — technique & care | 3 |

| S. No. | Topic | Hours |
|---|---|---|
| **13** | Care of ventilator accessories & infection prevention | 1 |
| **14** | Pharmacotherapy in MV — steroids, NMBs, sedation, analgesia | 1 |
| **15** | Aerosol therapy during MV | 1 |
| **16** | Weaning strategies — SBT, RSBI, tracheostomy weaning, long-term weaning | 3 |
| **17** | Withholding & withdrawing ventilator support (ethical considerations) | 1 |
| **18** | Troubleshooting ventilator alarms & limits | 1 |
| **19** | Assessment of outcome of MV & transport of ventilated patients | 2 |
| **20** | Non-invasive ventilation — equipment, modes, synchronization, pediatric NIV, quality control, disease-specific application, home ventilation, monitoring & complications, medico-legal aspects | 7 (aggregate) |

**Total Hours (approx.):38**

**Practical / Demonstration**

- Hands-on ventilator sessions, waveform interpretation workshops, PDT demo, transport simulation, NIV setup and weaning simulations. (Recommend 10–20 hours depending on local resources.)

**Learning Outcomes**

- Implement advanced ventilator strategies, interpret ventilator graphics and manage complications.
- Apply weaning protocols and ethical decision-making for long-term ventilation.
- Set up and manage NIV in different clinical contexts including pediatric and home settings.

## Pulmonary Rehabilitation & Sleep Medicine

**Total Hours:** Theory ~26 + Practical/Demo 20 = **~46 hours**

**Course Objectives**

Students will be able to:

1. Understand and implement core components of pulmonary rehabilitation (PR).
2. Design, nutritional and educational interventions for chronic respiratory patients.
3. Set up, perform and interpret sleep studies and basics of sleep lab technology.

**Topics & Hours**

| S. No. | Topic | Hours |
|---|---|---|
| **1** | Historical perspective of PR | 1 |
| **2** | Basic concepts & definition of PR | 2 |
| **3** | Selection & assessment of chronic respiratory disease patients (assessment tools) | 2 |
| **4** | Therapeutic interventions — ventilatory muscle training, nutritional assessment, preventive aspects | 2 |
| **5** | Tobacco dependence — pathophysiology, cessation programs | 2 |
| **6** | Sleep disorders in pulmonary patients (intro + clinic relevance) | 2 |
| **7** | Patient & family education in health management | 1 |
| **8** | Pediatric pulmonary rehabilitation | 1 |
| **9** | Rehabilitation in non-COPD lung disease | 1 |
| **10** | Rehabilitation for long-term tracheostomized patients | 1 |
| **11** | Bronchoscopy, BAL — Part 2 (procedural demos) | 4 |
| **12** | Thoracoscopy (intro/demo) | 2 |
| **13** | Assessment & interpretation of pulmonary function studies (PFTs) | 2 |
| **14** | Pre-operative PFTs & bedside assessment | 2 |
| **15** | Spirometry — lung volume interpretation | 2 |
| **16** | Measurement of DLCO | 2 |
| **17** | Spirometry & body plethysmography | 2 |
| **18** | Setting up a sleep lab | 2 |
| **19** | Technological advances in sleep study & management | 2 |

**Total Theory Hours:~26**

**Practical / Demo**

- **One hour practical/demonstration/discussion** per many PR topics is noted — overall **20 hours practical**, including exercise testing, spirometry/plethysmography/DLCO hands-on, sleep lab setup and polysomnography demos.

**Learning Outcomes**

- Perform patient selection and build tailored PR programs including education and smoking cessation support.
- Conduct and interpret spirometry, DLCO and basic sleep study outputs.
- Participate in bronchoscopy/BAL assistance and thoracoscopy observation.

**PROJECT WORK, ACADEMIC PRESENTATIONS, AND STUDENT EVALUATION**

| Component | Description & Guidelines | Marks |
|---|---|---|
| Project Work | Objective: To encourage research aptitude, evidence-based practice, and the application of theoretical knowledge to real-world clinical and community situations in Respiratory Technology.<br><br>Structure: Each student shall complete two project works during the program:1. Project 1 (Major Project): Conducted during the Third Year (Semester VI). Must be submitted one month before the final year examination. (*Carries 50 marks*)2. Project 2 (Internship Project / Case Report): Conducted during the Internship Period (Year IV). Must be submitted within six months of internship commencement. (*No marks weightage, mandatory for course completion*) Guidelines:• Topics will be assigned by the Department of Respiratory Technology within the first month of the respective year/phase.• Projects may include case studies, audits, clinical research, quality improvement studies, or device evaluation projects.• The report must follow a structured format: Title, Introduction, Institution& Objectives, Methodology, Results, Discussion, Conclusion, and References (APA/Vancouver style).• Ethical clearance is mandatory for studies involving human participants.• A viva-voce examination and presentation will be conducted to evaluate understanding and originality | 50 marks |

| Component | Description & Guidelines | Marks |
|---|---|---|
| | Evaluation Criteria (50 marks):• Relevance and originality of topic – 10 marks• Literature review and methodology – 10 marks• Data analysis and discussion – 10 marks• Presentation and defense – 10 marks• Report formatting and referencing – 10 marks | |
| Academic Presentations | Objective: To strengthen clinical reasoning, presentation skills, and critical appraisal of Respiratory Technology topics<br>Requirements: • Minimum two academic presentations per month during the final academic year.• Minimum one presentation per month during the internship period.• Topics will be selected by the student and approved by faculty or assigned directly by the department<br>Format: • PowerPoint or multimedia-based presentations (15–20 minutes).• Each session followed by a faculty-moderated discussion<br>Assessment Parameters (30 marks):• Content accuracy and scientific depth – 10 marks• Organization and clarity – 5 marks• Presentation skills and delivery – 5 marks• Ability to respond to questions – 5 marks• Use of audiovisual aids and referencing – 5 marks | 30 marks |
| Student Evaluation (Continuous Clinical Assessment) | Objective: To ensure consistent development of clinical proficiency, professional behavior, and patient-centered skills<br>Method:• Students are evaluated continuously throughout clinical postings and practical sessions.• Evaluation is performed by faculty supervisors, preceptors, and clinical mentors<br>Assessment Criteria (20 marks):• Clinical knowledge and decision-making – 5 marks• Procedural skills and hands-on competency – 5 marks• Professionalism, punctuality, and ethics – 4 marks• Communication and teamwork – 3 marks• Initiative and ability to handle clinical situations – 3 marks | 20 marks |
| **Total Marks** | | **100** |

## FOURTH YEAR – INTERNSHIP PROGRAM

| Program | Bachelor of Science in Respiratory Technology (B.Sc. RT) |
|---|---|
| **Academic Year** | Fourth Year |
| **Component** | One-Year Compulsory Internship |
| **Duration** | 12 Months (Full-Time) |
| **Eligibility** | Successful completion of all theory and practical examinations of the first three years of the program. |
| **Supervision** | Conducted under qualified Respiratory Technology faculty and consultants in recognized tertiary care teaching hospitals. |

**Description**

The **compulsory internship** is designed to provide immersive, hands-on clinical experience in multiple healthcare settings.

During this period, students consolidate the knowledge and skills acquired in the previous three years and develop independent professional competencies.

Interns function as **junior members of the Respiratory Technology team**, participating in direct patient care, procedural assistance, equipment management, and interdisciplinary collaboration.

**Internship Objectives**

By the end of the internship, students will be able to:

1. Perform patient assessment, initiate and monitor Respiratory Technology procedures independently.
2. Manage ventilated patients under supervision, including invasive and non-invasive modes.
3. Participate in airway management, resuscitation, and emergency interventions.
4. Conduct and interpret diagnostic tests such as PFTs, ABG analysis, and sleep studies.
5. Implement pulmonary rehabilitation and home-care planning.
6. Exhibit professional ethics, teamwork, and effective communication.
7. Demonstrate readiness for independent clinical practice or advanced postgraduate training.

**Internship Postings**

| Department / Clinical Area | Focus Areas |
|---|---|
| **Medical Intensive Care Unit (MICU)** | Ventilator management, airway care, oxygen therapy, patient monitoring |
| **Surgical Intensive Care Unit (SICU)** | Postoperative respiratory management, extubation protocols |
| **Neonatal & Pediatric Intensive Care Units (NICU/PICU)** | Neonatal ventilation, surfactant therapy, non-invasive support |
| **Emergency Medicine & Trauma Unit** | Airway management, CPR, acute respiratory distress management |
| **Pulmonary Medicine / PFT Lab** | Spirometry, diffusion studies, bronchial challenge tests |
| **Cardiothoracic & Neurocritical Care Units** | Advanced mechanical ventilation, hemodynamic monitoring |
| **Sleep Medicine & Polysomnography Unit** | Sleep study setup, scoring, and report interpretation |
| **Operation Theatres / Anesthesia Services** | Preoperative and postoperative ventilatory care |
| **Pulmonary Rehabilitation & Home Care Services** | breathing retraining, education |
| **Research / Academic Projects** | Clinical data collection, literature review, manuscript preparation |

**Internship Evaluation**

| Component | Mode of Evaluation | Weightage |
|---|---|---|
| Clinical Logbook & Attendance | Verified weekly by supervising faculty | 20% |
| Case Discussions & Journal Clubs | Monthly presentations | 15% |
| Supervisor's Clinical Rating | Based on knowledge, skills, attitude, and professionalism | 40% |
| Project / Case Report Submission | Written report and oral defense | 15% |
| Final Viva Voce | Comprehensive oral examination | 10% |

**REFERENCE BOOKS**

| Subject | Standard References |
|---|---|
| **Respiratory Care & Critical Care** | Egan's *Fundamentals of Respiratory Care* – Scanlon, Wilkins, Stoller<br>David Chang – *Clinical Application of Mechanical Ventilation*<br>Susan Pilbeam – *Mechanical Ventilation: Physiological and Clinical Applications*<br>J.B. West – *Respiratory Physiology: The Essentials*<br>Tobin – *Principles and Practice of Mechanical Ventilation*<br>Marino – *The ICU Book*<br>Irwin & Rippe – *Intensive Care Medicine* |
| **Respiratory Physiology & Pathophysiology** | John F. Murray & Jay A. Nadel – *Textbook of Respiratory Medicine*<br>J.F. Nunn – *Applied Respiratory Physiology* |
| **Pharmacology** | Tripathi – *Essentials of Medical Pharmacology*<br>Katzung – *Basic and Clinical Pharmacology* |
| **Anatomy & Physiology** | Gray's Anatomy – Williams et al.<br>Guyton & Hall – *Textbook of Medical Physiology*<br>B.D. Chaurasia – *Human Anatomy* |
| **Microbiology & Pathology** | Michael A.P. Faller & Patrick R. Murray – *Medical Microbiology*<br>Lakhani et al. – *Basic Pathology* |
| **Community Medicine & Psychology** | Park – *Textbook of Preventive and Social Medicine*<br>Morgan & King – *Introduction to Psychology* |
| **Pulmonary Rehabilitation & Physical Therapy** | Hodgkin, Wilkins & Lopez – *Pulmonary Rehabilitation: The Team Approach*<br>Donna Frownfelter & Elizabeth Dean – *Principles and Practice of Cardiopulmonary Physical Therapy*<br>Hillegas – *Essentials of Cardiopulmonary Physical Therapy* |
| **Neonatal Respiratory Care** | Avery – *Textbook of Neonatology*<br>Meharban Singh – *Care of the Newborn* |

## Practical / training hours for Bachelor of Science in Respiratory

***Therapy in various posting areas***

**During Internship Training**

| PRACTICAL TRAINING | | | |
|---|---|---|---|
| **S. No.** | **Topic** | **Total Hours** | **Attendance** |
| 1. | Ortho- Neuro & Trauma ICU | 100 | |
| 2. | Cardiovascular & Thoracic Surgical ICU Adult | 100 | |
| 3. | Cardiovascular & Thoracic Surgical ICU Pediatric & Neonate | 100 | |
| 4. | Medical Intensive Care Unit | 100 | |
| 5. | Neonatal ICU | 100 | |
| 6. | Coronary Care Unit | 100 | |
| 7. | Intermediate Intensive Care units | 100 | |
| 8. | Stroke Unit | 100 | |
| 9. | Emergency Care Unit & ICU | 100 | |
| 10. | Multiple wards | 100 | |
| 11. | Home Care | 100 | |
| 12. | Pulmonary Rehabilitation | 100 | |
| 13. | Pulmonology outpatient department | 100 | |
| 14. | Radiology Department | 100 | |
| 15. | PFT & Sleep Lab | 100 | |
| 16. | Transport Team – Ambulance Services (Inter & Intra Hospital) | 100 | |
| 17. | Neurology OPD | 50 | |
| 18. | Centre Sterile Supply Department (CSSD) | 50 | |
| 19. | Gas Plant | 50 | |
| 20. | Biomedical | 50 | |

## PATTERN OF QUESTION PAPERS

**Pattern A – 70 Marks (3 Hours)**

| Question Format | Marks per Question | No. of Questions | Mark Distribution | Total Marks |
|---|---|---|---|---|
| Multiple Choice Questions (MCQs) | 1 mark | 15 out of 15 | 15 | 70 Marks |
| Essay | 15 marks | 1 out of 2 | 15 | |
| Short Notes | 5 marks | 5 out of 6 | 25 | |
| Short Answers | 3 marks | 5 out of 7 | 15 | |

**Pattern B – 50 Marks (2 Hours)**

| Question Format | Marks per Question | No. of Questions | Mark Distribution | Total Marks |
|---|---|---|---|---|
| Multiple Choice Questions (MCQs) | 1 mark | 10 out of 10 | 10 | 50 Marks |
| Essay | 10 marks | 1 out of 2 | 10 | |
| Short Notes | 5 marks | 3 out of 5 | 15 | |
| Short Answers | 3 marks | 5 out of 7 | 15 | |

## SCHEME OF EXAMINATION

| Paper | Course Code | Subject Title | University Exam | Internal Assessment | Practical / Viva / Oral | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|
| **FIRST SEMESTER (YEAR 1)** | | | | | | | **500** |
| Paper I | RTY101 | Human Anatomy & Histology | 50 | 25 | 25 | 100 | |
| Paper II | RTY102 | Human Physiology | 50 | 25 | 25 | 100 | |
| Paper III | RTY103 | Biochemistry for Health Sciences | 50 | 25 | 25 | 100 | |
| Paper IV | RTY104 | Communication Skills & Health Informatics | – | 50 | 50 | 100 | |
| Paper V | RTY105 | Medical Terminology & Documentation | – | 50 | 50 | 100 | |
| **SECOND SEMESTER (YEAR 1)** | | | | | | | **400** |
| Paper VI | RTY201 | Community Health & Preventive Medicine | 50 | 25 | 25 | 100 | |
| Paper VII | RTY202 | Medical Microbiology | 50 | 25 | 25 | 100 | |
| Paper VIII | RTY203 | Behavioral Sciences & Clinical Psychology | 50 | 25 | 25 | 100 | |
| Paper IX | RTY204 | Patient Assessment & Contact Techniques (T&P) | 70 | 10 | 20 | 100 | |
| **THIRD SEMESTER (YEAR 2)** | | | | | | | **400** |
| Paper X | RTY301 | Applied Pathology | 50 | 25 | 25 | 100 | |
| Paper XI | RTY302 | Pharmacology for Respiratory Care | 50 | 25 | 25 | 100 | |
| Paper XII | RTY303 | Pulmonary Diseases – I | 70 | 10 | 20 | 100 | |
| Paper XIII | RTY304 | Fundamentals of Respiratory Care (T&P) | 70 | 10 | 20 | 100 | |

| Paper | Course Code | Subject Title | University Exam | Internal Assessment | Practical / Viva / Oral | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|
| **FOURTH SEMESTER (YEAR 2)** | | | | | | | **500** |
| Paper XIV | RTY401 | Pulmonary Diseases – II | 70 | 10 | 20 | 100 | |
| Paper XV | RTY402 | Diagnostic & Therapeutic Procedures (T&P) | 70 | 10 | 20 | 100 | |
| Paper XVI | RTY403 | Principles of Mechanical Ventilation – I (T&P) | 70 | 10 | 20 | 100 | |
| Paper XVII | RTY404 | Applied Cardiopulmonary Anatomy & Physiology | 50 | 25 | 25 | 100 | |
| Paper XVIII | RTY405 | Clinical Practicum I | – | 40 | 60 | 100 | |
| **FIFTH SEMESTER (YEAR 3)** | | | | | | | **400** |
| Paper XIX | RTY501 | Biostatistics, Research Methodology & Ethics | 70 | 10 | 20 | 100 | |
| Paper XX | RTY502 | Critical Care & Advanced Cardiothoracic Respiratory Care (with ACLS) | 70 | 10 | 20 | 100 | |
| Paper XXI | RTY503 | Neonatal & Pediatric Respiratory Care | 70 | 10 | 20 | 100 | |
| Paper XXII | RTY504 | Clinical Practicum II | – | 40 | 60 | 100 | |
| **SIXTH SEMESTER (YEAR 3)** | | | | | | | **400** |
| Paper XXIII | RTY601 | Principles of Mechanical Ventilation – II (T&P) | 70 | 10 | 20 | 100 | |
| Paper XXIV | RTY602 | Pulmonary Rehabilitation & Sleep Medicine | 70 | 10 | 20 | 100 | |
| Paper XXV | RTY603 | Research Project / Dissertation | – | 20 | 80 | 100 | |
| Paper XXVI | RTY604 | Clinical Practicum III | – | 40 | 60 | 100 | |

| Paper | Course Code | Subject Title | University Exam | Internal Assessment | Practical / Viva / Oral | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|
| **SEVENTH SEMESTER (YEAR 4)** | | | | | | | **100** |
| Paper XXVII | RTY701 | Internship – Phase I | – | 100 | – | 100 | |
| **EIGHTH SEMESTER (YEAR 4)** | | | | | | | **100** |
| Paper XXVIII | RTY801 | Internship – Phase II | – | 100 | – | 100 | |
| | | | | | | **GRAND TOTAL** | **2800 Marks** |

**OTES**

1. Minimum passing mark: **50% in each subject (theory and practical separately)**.
2. Internal marks include **periodic tests, assignments, seminars, and attendance**.
3. Practical evaluation includes **viva voce, OSCE/OSPE, skill performance, and logbook maintenance**.
4. A student must successfully complete **Project Work (RTY603)** and **Internship (RTY701–RTY801)** to be eligible for award of degree.
5. Supplementary examinations follow university examination regulations.

**GRADING SCALE AND CLASSIFICATION**

| Percentage Range | Grade | Grade Point | Description / Classification |
|---|---|---|---|
| 85% – 100% | A+ | 10 | Outstanding / Distinction with Honours |
| 75% – 84% | A | 9 | First Class with Distinction |
| 65% – 74% | B+ | 8 | First Class |
| 55% – 64% | B | 7 | Second Class |
| 50% – 54% | C | 6 | Pass |
| Below 50% | F | 0 | Fail / Reappearance Required |
| Absent | Ab | 0 | Absent from Examination |

**CLASSIFICATION OF SUCCESSFUL CANDIDATES**

| Aggregate Percentage (All Years) | Division Awarded |
|---|---|
| 75% and above (without reappearance) | **First Class with Distinction** |
| 60% – 74% | **First Class** |
| 50% – 59% | **Second Class** |
| Below 50% | **Fail** |

**ADDITIONAL REGULATIONS**

- A candidate must complete all four years (including internship) **within 6 years** from the date of admission.
- **Grace marks** (up to 5%) may be awarded at the discretion of the examination board in case of marginal failure.
- **Revaluation / Retotaling:** Permitted as per university examination policy.
- **Merit Ranking:** Based on aggregate marks of the first attempt in all university examinations up to the sixth semester.

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# Chapter-5

# Master of Respiratory Technology (MSc RT)

**1. Program Intent and Learning Objectives**

The MSC RT program Institution to:

- Develop **advanced clinical practitioners** with expertise in adult, neonatal, and pediatric respiratory care.
- Prepare graduates for **teaching, training, and leadership roles** in academic and clinical settings.
- Enhance **research capability**, evidence-based practice, and innovation in respiratory sciences.
- Build competencies in **interdisciplinary team collaboration** and healthcare leadership.

**Learning Objectives:**

- Attain mastery in complex respiratory diagnostics, therapies, and critical care interventions.
- Acquire skills to design and deliver **teaching modules, clinical workshops, and bedside training**.
- Conduct high-quality **clinical research and dissertation work** contributing to respiratory science.
- Demonstrate professional conduct, ethical responsibility, and patient-centered care.

**2. Program Expectations and Eligibility**

- **Eligibility:** B.Sc. Respiratory Technology or equivalent allied health science degree from a recognized university.
- **Duration:** 2 years (4 semesters; maximum completion time: 6 years).
- **Attendance:** Minimum 80% in all theory, clinical, and practical postings.
- **Intake Capacity:** As permitted by institutional facilities and faculty-to-student ratio (recommended max 1:4 in clinical training).
- **Progression:** Students may carry forward subjects but must clear all earlier semester exams before appearing for final semester.

**3. Training Methods and Formal Teaching Sessions**

- **Didactic sessions:** Advanced lectures, tutorials, and structured modules.
- **Seminars & Journal Clubs:** Mandatory participation, minimum 2 presentations per semester.
- **Case-Based Learning:** Discussion of complex ICU cases, ventilator strategies, and sleep disorders.
- **Simulation & Skills Labs:** Advanced procedures (ECMO, polysomnography, lung ultrasound, ABG interpretation).
- **Interdisciplinary teaching:** Joint sessions with critical care, pulmonology, anesthesia, and pediatrics.

**4. Logbook, Periodic Tests, and Graded Clinical Responsibility**

- **Logbook:**
  - Mandatory recording of procedures (ABG, intubations, ventilator setups, bronchoscopy assistance, sleep studies, PFTs)
  - Verified monthly by faculty.
- **Assessments:**
  - Minimum 2 sessional tests per subject per semester.
  - Pre-university/mock exams mandatory.
- **Graded Clinical Responsibility:**
  - Year 1: supervised interventions and participation in ward rounds.
  - Year 2: semi-independent management of critically ill patients under supervision, teaching of undergraduates, and leadership in RT procedures.

**5. Examination Scheme and Paper Structure**

- **Internal Assessment:** Minimum 50% in theory and practical required for eligibility.
- **University Examinations:** End of each semester.
- **Assessment Pattern:**
  - **Theory:** Structured essay (30 marks), short notes (25 marks), short answers (15 marks).
  - **Practical/OSCE:** Clinical case presentation, procedural OSCE stations, viva-voce.
  - **Dissertation/Project:** To be submitted 3 months before final exam; evaluated on originality, methodology, and defense.
- **Passing Criteria:** Minimum 50% aggregate in each subject (theory, viva, practical, and internal).

**6. Institutional Requirements for MSC RT Program**

Institutions offering MSC RT must ensure:

- Affiliated tertiary/quaternary hospital with **minimum 500 beds** and at least **50 ICU beds**.
- Dedicated **Respiratory Technology Department** with qualified faculty (at least one PhD/MD faculty, minimum two MSC RT-qualified educators).
- Access to advanced equipment: ventilators (conventional + advanced modes), polysomnography labs, ABG analyzers, lung ultrasound, ECMO, PFT labs.
- Skills and simulation labs with manikins for airway and ventilation training.
- Library access with recent respiratory journals and e-learning platforms.

**7. Scheme of Study (Core & Specialty Subjects)**

- Advanced Leadership, Healthcare Administration, and Strategic Management
- Principles of Teaching, Learning, and Curriculum Design in Health Professions
- Advanced Research Methods, Biostatistics, and Evidence-Based Practice
- Healthcare Quality, Patient Safety, and Outcome Evaluation
- Advanced Clinical Practice in Case Management and Pulmonary Rehabilitation
- Mechanical ventilation, Critical Care

**Specialty Structure:**

- **Adult Track:** Advanced Mechanical Ventilation, Critical Care Medicine I & II, Polysomnography, Advanced Procedures.
- **Neonatal/Pediatric Track:** Advanced Neonatal & Pediatric Respiratory Care, Pediatric Sleep Disorders, PALS/NALS, Pediatric Pulmonology, Advanced Procedures.

**8. Specialty Curriculum and Skills-Based Outcomes**

**Adult Specialization – Key Skills:**

- Ventilation strategies in ARDS, COPD, obesity, trauma, and neuromuscular diseases.
- Polysomnography scoring, PAP titration, CBT-I support.
- ECMO initiation and monitoring.
- Advanced procedures: ABG sampling, chest tube management, lung ultrasound, bronchoscopy assistance.

**Neonatal & Pediatric Specialization – Key Skills:**

- Neonatal resuscitation, NIPPV, CPAP, and advanced ventilator modes.
- Management of pediatric ARDS, asthma, congenital anomalies, and sleep-disordered breathing.
- Pediatric bronchoscopy assistance, airway clearance therapies.
- ECMO and nitric oxide therapy in pediatrics.

**Outcome Expectations:**

- Competent **advanced respiratory care practitioners** ready for ICU, sleep labs, academic teaching, and independent research.
- Ability to lead RT teams, train undergraduates, and contribute to respiratory care policy development.

**Credit System**

The term credit is used to describe the quantum of syllabus for various programs in terms and hours of study. It indicates differential weightage given according to the contents and duration of the courses in the curriculum design.

Credits will be assigned based on the Lectures (L) / Tutorials (T) / Clinical Postings (CR) / Practical Work (P) / Research Work (RP).

**L** - One credit for one-hour lecture per week (1 credit = 15 hours)
**T** - One credit for one-hour practical per week (1 credit = 15 hours)
**P** - One credit for every two hours of laboratory or practical per week (1 credit = 30 hours)
**CT** - One credit for three hours of clinics per week (1 credit = 45 hours)
**RP** - One credit for two hours of dissertation or Project work per week - max credit 20-25 (1 credit = 30 hours)

| Duration | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Training / Rotation (CL) | Research Project (RP) |
|---|---|---|---|---|---|
| **Credits** | 1 Credit | 1 Credit | 1 Credit | 1 Credit | 1 Credit |
| **Hours / Week** | 1 Hour | 1 Hours | 2 hours | 3 Hours | 2 hours |
| **Hours / Semester** | 15 Hours | 15 Hours | 30 Hours | 45 Hours | 30 Hours |

**VI.2. Grading System**

**VI.2.a Letter grades and grade points allocations:**

Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table ± XII.

**Table ± 1 : Letter grades and grade points equivalent to Percentage of marks and performances**

| Percentage of Marks Obtained | Letter Grade | Grade Point | Performance |
|---|---|---|---|
| 90.00 ± 100.00 | O | 10 | Outstanding |
| 80.00 ± 89.99 | A | 9 | Excellent |
| 70.00 ± 79.99 | B | 8 | Good |
| 60.00 ± 69.99 | C | 7 | Fair |
| 50.00 ± 59.99 | D | 6 | Average |
| Less than 50 | F | 0 | Fail |
| Absent | AB | 0 | Fail |

A learner who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

**Semester Grade Point Average (SGPA)**

The performance of a student in each semester shall be indicated by a **Semester Grade Point Average (SGPA)**.

The SGPA is the **weighted average of grade points** obtained in all the courses (theory and practical) taken by the student during that semester.

If a student has registered for *n* courses in a semester with corresponding credits $\mathbf{C_1, C_2, C_3 \ldots C_n}$ and obtained grade points $\mathbf{G_1, G_2, G_3 \ldots G_n}$, the SGPA is calculated as:

SGPA=(C1G1+C2G2+C3G3+...+CnGn)(C1+C2+C3+...+Cn)\text{SGPA} = \frac{(C_1G_1 + C_2G_2 + C_3G_3 + \ldots + C_nG_n)}{(C_1 + C_2 + C_3 + \ldots + C_n)}SGPA=(C1+C2+C3+...+Cn)(C1G1+C2G2+C3G3+...+CnGn)

**Example:**

If a student takes five courses in a semester and earns the following credits and grade points:

| Course | Credits (C) | Grade Points (G) | Product (C×G) |
|---|---|---|---|
| Course 1 | $C_1$ | $G_1$ | $C_1G_1$ |
| Course 2 | $C_2$ | $G_2$ | $C_2G_2$ |
| Course 3 | $C_3$ | $G_3$ | $C_3G_3$ |
| Course 4 | $C_4$ | $G_4$ | $C_4G_4$ |
| Course 5 | $C_5$ | $G_5$ | $C_5G_5$ |

Then,

SGPA=C1G1+C2G2+C3G3+C4G4+C5G5C1+C2+C3+C4+C5\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}SGPA=C1+C2+C3+C4+C5C1G1+C2G2+C3G3+C4G4+C5G5

The SGPA shall be calculated **up to two decimal places**.

If a student receives an **'F' (Fail)** or **'AB' (Absent)** grade in any course, those courses shall also be included in the SGPA calculation, with a **grade point value of zero** for that course.

For example, if the student has an 'F' or 'AB' grade in course 4, the formula becomes:

SGPA=C1G1+C2G2+C3G3+C4(0)+C5G5C1+C2+C3+C4+C5\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4(0) + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}SGPA=C1+C2+C3+C4+C5C1G1+C2G2+C3G3+C4(0)+C5G5

**Cumulative Grade Point Average (CGPA)**

The **Cumulative Grade Point Average (CGPA)** is a measure of a student's overall academic performance across all semesters of the program.It is calculated using the SGPA of each completed semester and the corresponding total semester credits.

If the credits for each semester are $\mathbf{C_1, C_2, C_3 \ldots C_n}$ and the corresponding SGPAs are $\mathbf{S_1, S_2, S_3 \ldots S_n}$, then:

CGPA=(C1S1+C2S2+C3S3+...+CnSn)(C1+C2+C3+C4+...+Cn)\text{CGPA} = \frac{(C_1S_1 + C_2S_2 + C_3S_3 + \ldots + C_nS_n)}{(C_1 + C_2 + C_3 + C_4 + \ldots + C_n)}CGPA=(C1+C2+C3+C4+...+Cn)(C1S1+C2S2+C3S3+...+CnSn)

The CGPA shall also be calculated **up to two decimal places**.

**Notes:**

- The CGPA shall reflect the *failed status* (F grade) until the student passes the course.
- Once a failed course is successfully completed, the new grade and grade points will replace the earlier failed grade in CGPA computation.
- The final grade card or transcript will indicate the CGPA along with grades earned in each semester.

**Declaration of Class**

The **classification of results** shall be based on the final CGPA obtained at the end of the program, as shown below:

| CGPA Range | Division / Class Awarded | Description |
|---|---|---|
| 7.50 and above | **First Class with Distinction** | Awarded to candidates who obtain a CGPA of 7.50 or above, provided they have passed all courses in the first attempt. |
| 6.00 – 7.49 | **First Class** | Awarded to candidates who obtain a CGPA between 6.00 and 7.49. |
| 5.00 – 5.99 | **Second Class** | Awarded to candidates who obtain a CGPA between 5.00 and 5.99. |
| Below 5.00 | **Fail** | Candidate is declared failed and required to reappear. |

**Additional Guidelines**

1. The SGPA and CGPA shall be shown on the **grade sheet / transcript** issued at the end of each semester and on the **final degree certificate**.
2. A student must pass all subjects (theory and practical) and complete all credits prescribed in the curriculum to qualify for the **award of degree**.
3. **Grace marks** (up to 5%) may be awarded at the discretion of the Examination Board in case of marginal failure, subject to university regulations.

**General Considerations and Teaching / Learning Approach**

The teaching–learning process in the program shall emphasize both **theoretical understanding** and **practical skill acquisition**, ensuring a learner-centered and outcome-oriented education system.

Students should be provided with **ample opportunities for self-directed learning**, reflective practice, and critical thinking throughout the course.

**Teaching and Learning Strategies**

To achieve these objectives, the program shall employ a combination of the following methods:

- **Lectures, tutorials, and interactive discussions**
- **Demonstrations and skill-based laboratory sessions**
- **Clinical postings and hands-on training in healthcare settings**
- **Seminars, journal clubs, and workshops**
- **Problem-based learning (PBL) and case discussions**
- **Simulation-based and scenario-driven teaching**
- **Collaborative and interprofessional learning sessions**

Emphasis shall be placed on **active student participation**, **independent learning**, and **continuous formative assessment**.

**Maintenance of Records**

Each department shall maintain **systematic records** of student academic and clinical performance, including attendance, assignments, internal assessments, and clinical competencies.

These records shall form the **basis for student evaluation** and shall be made available for **inspection by any statutory or accreditation authority** when required.

**Project Work**

Each student shall undertake a **research or applied project** during the final year of the program under the supervision of a **Project Guide** and in consultation with the **Head of the Department (HOD)**.

**Guidelines**

- The project topic shall be approved by the departmental research committee or academic coordinator.
- The project must be completed and submitted **at least three months prior to the commencement of the final semester university examination**.
- Submission of the project report, duly certified by the Project Guide and HOD, is **mandatory for eligibility to appear for the final examination**.
- The project report shall follow standard academic structure: *Title, Introduction, Institution& Objectives, Literature Review, Methodology, Results, Discussion, Conclusion, and References (APA/Vancouver style).*
- A **viva-voce or presentation** may be conducted to evaluate the student's understanding and contribution.

**Maintenance of Logbook**

**1. Purpose**

Every student shall maintain a **comprehensive logbook** to record the academic and clinical competencies acquired during the training period. The logbook serves as a **continuous record of learning progress** and is an essential component of the evaluation process.

**2. Content and Certification**

- The logbook should include details of **clinical postings, case studies, procedures performed, seminars, journal clubs, workshops, and research activities.**
- Each entry must be **verified and signed** by the supervising faculty or Head of the concerned Department/Program Coordinator.
- The **HOD/Program Coordinator** shall review and authenticate the logbook entries **on a weekly or monthly basis** to ensure completeness and accuracy.
- The student shall compile a **summary of all activities and skills acquired** at the end of the program.

**3. Submission**

- The final logbook must be **certified by the Head of the Department and the Principal/Program Director** prior to submission.
- The **certified logbook shall be presented during the final practical examination** for review by the Board of Examiners.
- Maintenance of a duly completed and certified logbook is a **mandatory requirement for appearing in the final university practical examination**.
- **Additional Notes**

- Students are expected to actively participate in **seminars, journal clubs, case presentations, interdisciplinary meetings, and continuing education programs** as part of their academic development.
- Faculty members are encouraged to promote **research engagement and academic writing** among postgraduate students through mentoring and regular review.
- The Head of Department shall ensure compliance with logbook and project submission timelines prior to university examination eligibility clearance.

## M.Sc. Respiratory Technology – Adult Respiratory Care (ARC)

**L – Lecture | T – Tutorial | P/CL – Practical / Clinical | RP – Research Project**

### First Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY101** | Leadership & Administration | 1 | 1 | 3 | 5 | 3 |
| **MSC RTY102** | Research Methods & Biostatistics | 2 | 1 | – | 3 | 3 |
| **MSC RTY103** | Pulmonary Rehabilitation | 2 | 2 | 3 | 7 | 5 |
| **MSC RTY104** | Quality & Patient Safety | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY105** | Clinical Practicum I | – | – | 15 | 15 | 5 |
| **Total** | | **7** | **5** | **24** | **36** | **20** |

### Second Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY201** | Teaching & Learning in Health Professions | 2 | – | 6 | 8 | 4 |
| **MSC RTY202** | Cardiopulmonary Physiology & Trauma Care | 2 | – | 6 | 8 | 4 |
| **MSC RTY203** | Evidence-Based Respiratory Care & Presentation Skills – I | 3 | – | – | 3 | 3 |
| **MSC RTY204** | Advanced Mechanical Ventilation | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY205** | Clinical Practicum II | – | – | 15 | 15 | 5 |
| **Total** | | **9** | **1** | **30** | **40** | **20** |

## Third Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY301** | Case Management | 2 | – | 6 | 8 | 4 |
| **MSC RTY302** | Polysomnography | 1 | 1 | 3 | 5 | 3 |
| **MSC RTY303** | Critical Care Medicine – I | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY304** | Advanced Procedures | 1 | 1 | 6 | 8 | 4 |
| **MSC RTY305** | Clinical Practicum III | – | – | 15 | 15 | 5 |
| **Total** | | **6** | **3** | **33** | **42** | **20** |

## Fourth Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY401** | Evidence-Based Respiratory Care & Presentation Skills – II | 2 | – | 9 | – | 5 |
| **MSC RTY402** | Critical Care Medicine – II | 2 | – | 9 | – | 5 |
| **MSC RTY403** | Thesis / Dissertation | – | – | – | 9 | 3 |
| **MSC RTY404** | Clinical Practicum IV | – | – | 21 | – | 7 |
| **Total** | | **4** | – | **39** | **9** | **20** |

## Summary of Credits

| Semester | Credits |
|---|---|
| First Semester | 20 |
| Second Semester | 20 |
| Third Semester | 20 |
| Fourth Semester | 20 |

**Notes**

1. **Evidence-Based Respiratory Care & Presentation Skills – I & II** focus on literature appraisal, clinical guideline evaluation, journal critique, data interpretation, and professional presentation delivery.
2. **Clinical Practicums (I–IV)** progressively develop advanced hands-on and decision-making competencies.
3. The **Thesis / Dissertation (MSC RTY403)** integrates applied research and evidence translation into Respiratory Technology practice.
4. Completion of all 80 credits, including the thesis and clinical requirements, is mandatory for the **award of M.Sc. Respiratory Technology (Adult Respiratory Care)**.

## Semester-wise Distribution of Subjects

**M.Sc. Respiratory Technology – Adult Respiratory Care (ARC)**

### First Semester (Year 1)

| Paper | Course Code | Course Title |
|---|---|---|
| Paper I | MSC RTY101 | Leadership & Administration |
| Paper II | MSC RTY102 | Research Methods & Biostatistics |
| Paper III | MSC RTY103 | Pulmonary Rehabilitation |
| Paper IV | MSC RTY104 | Quality & Patient Safety |
| Paper V | MSC RTY105 | Clinical Practicum I |

### Second Semester (Year 1)

| Paper | Course Code | Course Title |
|---|---|---|
| Paper VI | MSC RTY201 | Teaching & Learning in Health Professions |
| Paper VII | MSC RTY202 | Cardiopulmonary Physiology & Trauma Care |
| Paper VIII | MSC RTY203 | Evidence-Based Respiratory Care & Presentation Skills – I |
| Paper IX | MSC RTY204 | Advanced Mechanical Ventilation |
| Paper X | MSC RTY205 | Clinical Practicum II |

## Third Semester (Year 2)

| Paper | Course Code | Course Title |
|---|---|---|
| Paper XI | MSC RTY301 | Case Management |
| Paper XII | MSC RTY302 | Polysomnography |
| Paper XIII | MSC RTY303 | Critical Care Medicine – I |
| Paper XIV | MSC RTY304 | Advanced Procedures |
| Paper XV | MSC RTY305 | Clinical Practicum III |

## Fourth Semester (Year 2)

| Paper | Course Code | Course Title |
|---|---|---|
| Paper XVI | MSC RTY401 | Evidence-Based Respiratory Care & Presentation Skills – II |
| Paper XVII | MSC RTY402 | Critical Care Medicine – II |
| Paper XVIII | MSC RTY403 | Thesis / Dissertation |
| Paper XIX | MSC RTY404 | Clinical Practicum IV |

## MSc RESPIRATORY TECHNOLOGY — PROGRAM SYLLABUS

**Year 1 — FIRST SEMESTER**

**1. Leadership & Administration**

**Total Hours:** 44

**Course Objective:** Introduce leadership theory and management practices tailored to health-care organizations; equip students to lead teams, manage operations and deliver value in respiratory care services.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Leadership: An Elusive Concept | 2 |
| 2 | Financial Health — the Taproot of an Organization | 4 |
| 3 | Cultivating the Leadership Relationship | 4 |
| 4 | Learning Organization — the Roots of an Organization | 4 |
| 5 | Building Commitment — Getting Others to Follow | 4 |
| 6 | Operations — the Trunk of an Organization | 4 |
| 7 | Communicating with Clarity | 4 |
| 8 | Strategic Priorities — the Branches of an Organization | 4 |
| 9 | The Art of Effectively Facilitating Processes | 4 |
| 10 | Value Creation — the Leaves and Blossoms of an Organization | 4 |
| 11 | Getting Results | 4 |
| 12 | Developing Others | 4 |
| 13 | Conclusion: Leading in the Future | 4 |

**Practicals / Activities (recommended)**

- Case studies on healthcare teams, simulated leadership exercises, SWOT & strategic plan workshop (8 hours).

**Learning Outcomes**

- Apply leadership models to healthcare teams, develop strategic priorities, manage operations and finances, and coach staff for performance.

**Biostatistics & Research Methodology**

**Total Hours:** 32

**Course Objective:** Teach fundamentals of research design, data collection and analysis, ethical conduct and technical/scientific reporting for clinical research in respiratory care.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Fundamentals of Research: Introduction | 2 |
| 2 | Defining the Research Problem | 2 |
| 3 | Research Design & Sampling Design | 2 |
| 4 | Measurement & Scaling Techniques | 2 |
| 5 | Methods of Data Collection; Processing & Analysis | 2 |
| 6 | Sampling Fundamentals | 2 |
| 7 | Testing of Hypotheses — Parametric & Non-parametric | 2 |
| 8 | Interpretation & Report Writing | 2 |
| 9 | Literature Survey & Documentation | 2 |
| 10 | Data Collection, Analysis & Hypothesis | 2 |
| 11 | Research Ethics, Plagiarism & Impact of Research | 2 |
| 12 | Technical Writing & Reporting of Research | 2 |
| 13 | Project Cost Management | 2 |
| 14 | Advanced Measurement & Scaling (repeat entry consolidated) | 2 |
| 15 | Funding Agencies & Research Grants | 2 |
| 16 | Declaration of Helsinki & Research Governance | 2 |

**Practicals / Activities**

- Hands-on sessions: sample size calculation, use of statistical software (SPSS/R), critical appraisal of articles, grant summary exercise (8 hours).

**Learning Outcomes**

- Design a research study, choose appropriate statistical tests, analyse data, write a research protocol and address ethics and funding pathways.

**Pulmonary Rehabilitation**

**Total Hours:** 28

**Course Objective:** Provide evidence-based principles and clinical skills to design, implement and evaluate pulmonary rehabilitation programmes.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Overview of Pulmonary Rehabilitation | 2 |
| 2 | Selecting & Assessing PR Candidates | 4 |
| 3 | Functional capacity Assessment & Training | 4 |
| 4 | Collaborative Self-management & Patient Education | 4 |
| 5 | Psychological Assessment & Intervention | 4 |
| 6 | Nutritional Assessment & Intervention | 4 |
| 7 | Patient-centred Evidence-based Outcomes | 4 |
| 8 | Disease-specific Approaches in PR | 4 |

**Practicals / Demos**

- Functional capacity testing (6MWT, ISWT), psychosocial assessment role plays, nutritional screening. (12 hours recommended).

**Learning Outcomes**

- Assess PR candidates, prescribe individualized nutrition plans, provide education and measure outcomes.

**Quality & Patient Safety**

**Total Hours:** 36

**Course Objective:** Introduce frameworks and measurement tools to evaluate, improve and research quality and safety in respiratory care.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Measuring Quality of Health Care | 4 |
| 2 | Quality of Care — Definitions & Concepts | 4 |
| 3 | Quality & Resource Constraints | 4 |
| 4 | Approaches to Quality Measurement | 4 |
| 5 | Advances in Quality Measurement | 4 |
| 6 | Structure, Process & Outcome Measures of Care Quality | 4 |
| 7 | Choosing Measures for Research Projects | 4 |
| 8 | Health-related Quality of Life — COPD, Asthma | 4 |
| 9 | Disease-specific QOL Tools (QOL-5 etc.) | 4 |
| 10 | QOL — Assessment, Analysis & Interpretation | 8 |

**Practicals / Activities**

- QOL questionnaire administration & scoring, process mapping, root cause analysis (8 hours).

**Learning Outcomes**

- Use quality measures and QOL tools, design quality improvement projects, and interpret outcomes to inform practice.

**Assessment**

- QI project (40%), QOL analysis assignment (20%), Exam (40%).

## Year 1 — SECOND SEMESTER

**Teaching & Learning in Health Professions**

**Total Hours:** 38

**Course Objective:** Prepare graduates for educational roles: curriculum design, teaching methods, assessment and competency-based education in health professions.

**Lecture Topics & Hours** (each 2 hours unless noted)

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | The teacher is important | 2 |
| 2 | Faces of a good teacher | 2 |
| 3 | Basic educational principles | 2 |
| 4 | Being an enthusiastic & passionate teacher | 2 |
| 5 | Collaborating & working as a team | 2 |
| 6 | Checking performance & CPD | 2 |
| 7 | Move to outcome/competency-based approach | 2 |
| 8 | Specifying learning outcomes & competencies | 2 |
| 9 | Communicating learning outcomes & competencies | 2 |
| 10 | Implementing outcome-based approach | 2 |
| 11 | The “authentic” curriculum (practical learning) | 2 |
| 12 | Ten questions when planning curriculum | 2 |
| 13 | Sequencing & spiral curriculum | 2 |
| 14 | Student engagement & student-centred approach | 2 |
| 15 | Building learning around clinical problems | 2 |
| 16 | Interprofessional education, apprenticeship, community-based education | 2 |
| 17 | Educational environment & curriculum mapping | 2 |
| 18 | Styles of teaching | 2 |
| 19 | Assessment — theory & practice | 2 |

**Practicals / Activities**

- Microteaching sessions, OSCE/assessment design workshop, curriculum mapping exercise (8 hours).

**Learning Outcomes**

- Design competency-based modules, perform microteaching, create assessments aligned to outcomes, and implement student-centred teaching.

**Cardiopulmonary Physiology & Trauma Life Support**

**Total Hours:** 36

**Course Objective:** Advanced cardiopulmonary physiology with applied trauma life support training for critical respiratory situations.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Ventilation (respiratory physiology) | 1 |
| 2 | Pulmonary function measurements | 1 |
| 3 | Diffusion of pulmonary gases | 1 |
| 4 | $O_2$ & $CO_2$ transport | 3 |
| 5 | Acid-base balance & regulation | 3 |
| 6 | V/Q relationships | 1 |
| 7 | Control of ventilation | 1 |
| 8 | Aging & cardiopulmonary system | 1 |
| 9 | Electrical conduction of heart | 1 |
| 10 | ECG & interpretation | 1 |
| 11 | Exercise & cardiopulmonary responses | 1 |
| 12 | High altitude & effects | 1 |
| 13 | High pressure environments | 1 |
| 14 | ITLS: initial assessment & management | 2 |
| 15 | Airway & ventilatory management | 2 |
| 16 | Shock (overview & management) | 2 |
| 17 | Thoracic trauma | 2 |
| 18 | Abdominal & pelvic trauma | 2 |
| 19 | Head trauma | 2 |
| 20 | Spine & spinal cord trauma | 2 |
| 21 | Musculoskeletal trauma | 2 |
| 22 | Thermal injuries | 2 |
| 23 | Pediatric trauma | 2 |

**Practicals / Activities**

- ECG workshops, ABG & acid-base lab, trauma simulation & airway drills, exercise physiology testing (12 hours).

**Learning Outcomes**

- Interpret advanced cardiopulmonary physiology, manage acute trauma airways and circulation, and apply ITLS algorithms.

**Evidence-Based Respiratory Care & Presentation Skills – I**

**Total Hours:** 20

**Course Objective:** Critical appraisal and presentation of high-impact journal articles relevant to respiratory and critical care.

**Seminar Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Journal article — Critical Care | 4 |
| 2 | Journal article — Respiratory Technology | 4 |
| 3 | Journal article — Respiratory Care Journal | 4 |
| 4 | Journal article — Trauma & Emergency | 4 |
| 5 | Journal article — IJRC (or equivalent) | 4 |

**Assessment**

- Presentation & critical appraisal (100%) — rubric includes literature search, methodology critique, clinical implications.

**Advanced Mechanical Ventilation**

**Total Hours:** 44

**Course Objective:** In-depth coverage of modern ventilatory modes, monitoring, complications and advanced bedside management strategies.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Historical perspective on ventilation | 2 |
| 2 | Conventional ventilatory support methods | 4 |
| 3 | Advanced modes: VAPS, PAV, NAVA, ASV | 4 |
| 4 | Noninvasive ventilatory support methods | 4 |
| 5 | Unconventional ventilatory techniques | 4 |
| 6 | Ventilatory support in special settings (ECMO interface, thoracic surgery etc.) | 4 |
| 7 | Physiological effects of mechanical ventilation | 4 |
| 8 | Artificial airways & management | 4 |
| 9 | Complications in ventilated patients | 4 |
| 10 | Monitoring of ventilated patients | 4 |
| 11 | Management of ventilated patients (weaning, protocols) | 4 |
| 12 | Adjunctive therapies (inhaled vasodilators, recruitment, nitric oxide etc.) | 4 |

**Practicals / Demonstrations**

- Ventilator simulator workshops, waveform analysis labs, non-invasive ventilation trials, bedside ventilator management simulations (20 hours).

**Learning Outcomes**

- Select and manage advanced ventilatory modes, interpret monitoring data, and manage complications and adjunctive therapies.

## Year 2 — SEMESTER THREE

**Case Management**

**Total Hours:** 40

**Course Objective:** Teach principles and practice of case management, care coordination and interdisciplinary processes in respiratory services.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Evolution of case management practice | 4 |
| 2 | Overview of case management practice | 4 |
| 3 | Roles of a case manager | 4 |
| 4 | Example of case management model | 4 |
| 5 | Case management skills — interpersonal, connecting, info-gathering | 4 |
| 6 | Specialized practice skills | 4 |
| 7 | Components of intervention & evaluation | 4 |
| 8 | RT case management specifics | 4 |
| 9 | Case management for special populations | 4 |
| 10 | Challenges & vision for case management | 4 |

**Practicals / Activities**

- Case studies, discharge planning simulations, community resource mapping (12 hours).

**Learning Outcomes**

- Lead case management activities, coordinate multidisciplinary care, and evaluate outcomes.

**Polysomnography**

**Total Hours:** 24

**Course Objective:** Prepare specialists to perform sleep studies, scoring, interpretation and therapeutic management (PAP, CBT-I).

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Sleep across the life cycle | 2 |
| 2 | Anatomy & physiology of sleep | 2 |
| 3 | Patient care & education in sleep medicine | 2 |
| 4 | Sleep questionnaires | 2 |
| 5 | Sleep disorders overview | 2 |
| 6 | Polysomnography instrumentation | 2 |
| 7 | Home sleep studies | 2 |
| 8 | Scoring sleep studies (adult &paediatric) | 2 |
| 9 | Treatment of sleep disorders | 2 |
| 10 | PAP therapy | 2 |
| 11 | Report generation | 2 |
| 12 | CBT-I (insomnia) | 2 |
| 13 | Psychiatric disorders of sleep & treatments | 2 |

**Practicals / Lab**

- Sleep lab setup & scoring workshops, PSG instrumentation, supervised recordings & scoring practicum (20 hours recommended).

**Learning Outcomes**

- Conduct and score PSGs, interpret sleep data, manage PAP therapy and apply CBT-I basics.

**Critical Care Medicine I**

**Total Hours:** 30

**Course Objective:** Advanced critical care topics covering ICU organization, monitoring, resuscitation and multi-organ dysfunction relevant to respiratory therapists.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | ICU design & organization | 2 |
| 2 | Transport of critically ill | 2 |
| 3 | Shock — overview | 2 |
| 4 | Hemodynamic monitoring | 2 |
| 5 | Multiple organ dysfunction syndrome | 2 |
| 6 | Monitoring oxygenation | 2 |
| 7 | Lactic acidosis | 2 |
| 8 | Acute cardiac syndromes (investigations & interventions) | 2 |
| 9 | Cardiovascular monitoring | 2 |
| 10 | Adult CPR (advanced) | 2 |
| 11 | Cardiac pacing & ICDs | 2 |
| 12 | Acute heart failure | 2 |
| 13 | Valvular & congenital heart disease | 2 |
| 14 | Respiratory monitoring | 2 |
| 15 | Upper airway obstruction & acute respiratory failure | 2 |
| 16 | ARDS | 2 |
| 17 | Airflow limitation, pneumonia, atelectasis & pleural problems | 2 |

**Practicals**

- Hemodynamic monitoring labs, ICU transport simulation, advanced CPR/ACLS scenarios (20 hours).

**Learning Outcomes**

- Manage ICU monitoring systems, transport, resuscitation and ARDS protocols in multidisciplinary teams.

**Advanced Procedures**

**Total Hours:** 49

**Course Objective:** Hands-on procedural skills essential for advanced respiratory practice (vascular access, chest procedures, imaging interpretation, advanced PFT/PSG).

**Lecture & Practical Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Arterial puncture for ABG | 2 |
| 2 | Arterial cannulation | 2 |
| 3 | Venous cannulation (central/peripheral) | 2 |
| 4 | Chest tube insertion, aspiration, repositioning & removal | 4 |
| 5 | Bronchoscopic sampling — BAL, endobronchial brushing | 4 |
| 6 | Chest X-ray interpretation | 4 |
| 7 | Lung ultrasound — focused lung US | 6 |
| 8 | CT Chest (interpretation & protocols) | 4 |
| 9 | PFT basic & advanced | 5 |
| 10 | Polysomnography (practical) | 5 |
| 11 | Airway management techniques (advanced) | 5 |
| 12 | Basic Life Support (refresher & assessment) | 5 |
| 13 | Advanced Cardiac Life Support | 5 |
| 14 | Extracorporeal Membrane Oxygenation (ECMO) — overview & basics | 5 |

**(Practical emphasis: many of the above items are primarily hands-on; lab hours included.)**

**Learning Outcomes**

- Perform bedside procedural skills safely, obtain diagnostic samples, interpret imaging and advanced PFT/PSG reports, and assist in ECMO/advanced life support under supervision.

## Year 2 — SEMESTER FOUR

**Critical Care Medicine II**

**Course Code:** MSRT701 — **Credits:** 4 — **Total Hours:** 40

**Course Objective:** Advanced critical care topics emphasizing multi-system organ support, complex monitoring and ICU nutrition & metabolic care.

**Lecture Topics & Hours**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Acute & chronic renal failure | 4 |
| 2 | Neurological monitoring & neuromuscular syndromes | 4 |
| 3 | Stroke, meningitis & encephalitis | 4 |
| 4 | Obstetric intensive care | 4 |
| 5 | Electrolyte disturbances & DIC | 4 |
| 6 | Drowning & sedation considerations | 4 |
| 7 | Sepsis & shock, poisoning | 4 |
| 8 | Trauma: multiple trauma& TBI | 4 |
| 9 | Fluid management | 2 |
| 10 | Acid-base abnormalities | 2 |
| 11 | Haemoptysis& pulmonary embolism | 2 |
| 12 | Pericardial tamponade & pulmonary hypertension | 8 |
| 13 | Pancreatitis, acute hepatic failure, nutrition in ICU | 2 |

**Practicals / Activities**

- Multi-organ simulation scenarios, ECMO/CRRT interfaces, nutrition rounds, invasive monitoring labs (24 hours recommended).

**Learning Outcomes**

- Manage multi-organ critical illness, integrate monitoring & support modalities, and design care plans for complex ICU patients.

## Evidence-Based Respiratory Care & Presentation Skills – II

### Course Description

This course emphasizes journal reading, critical appraisal, and professional presentation skills. It aims to enhance students' ability to interpret current research evidence in respiratory care and effectively communicate findings through oral and poster presentations.

### Course Objectives

By the end of the course, students will be able to:

1. Critically read and interpret respiratory care research articles.
2. Present journal reviews effectively in academic and professional forums.
3. Develop confidence in oral and poster presentations.

### Detailed Syllabus

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Introduction to Evidence-Based Respiratory Care – Recap of key principles | 3 |
| 2 | Journal selection and literature search (PubMed, Google Scholar) | 4 |
| 3 | Components of a research article – IMRaD structure | 4 |
| 4 | Critical reading and appraisal of journal articles | 8 |
| 5 | Preparing journal presentations – format, slides, summary writing | 6 |
| 6 | Oral presentation techniques and scientific communication | 6 |
| 7 | Poster preparation and presentation practice | 6 |
| 8 | Peer review, group discussions, and feedback sessions | 8 |

### Teaching and Learning Methods

- Journal club presentations
- Group discussions and peer review
- Guided reading and appraisal sessions
- Faculty feedback and mentoring

### Assessment Pattern

| Component | Weightage |
|---|---|
| Journal Presentation (Oral) | 40% |
| Poster Presentation | 20% |
| Journal Appraisal Report | 20% |
| Class Participation & Feedback | 20% |

**Suggested Readings**

1. Straus S.E. et al. *Evidence-Based Medicine: How to Practice and Teach EBM*.
2. Guyatt G. et al. *Users' Guides to the Medical Literature*.
3. Selected articles from *Respiratory Care Journal*, *Chest*, *Critical Care Medicine*, and *ATS Journals*.

**Programme Completion & Capstone**

- **Research Project / Thesis:** Each MSc RT candidate completes a supervised research project during Year 2 with formal presentation and dissertation submission. Suggested credit: **8–12 credits** depending on university policy. Timing: start in Semester 3, submit in Semester 4.
- **Logbook & Clinical Competency:** Students must maintain a procedural logbook with minimum numbers for key skills (ABG, suctioning, ventilator setups, PFTs, PSGs, chest tube assist, arterial/venous access under supervision) and obtain sign-offs.
- **Total Programme Credits (suggested):** 60–80 credits depending on thesis weighting and institutional crediting rules.

**General Assessment Pattern (suggested)**

- **Theory Exams:** end-semester written papers (60–70%).
- **Practicals/OSCEs/Simulations:** competency stations and skill checks (20–40%).
- **Continuous Assessment:** seminars, assignments, journal clubs, attendance and participation (10–20%).
- **Thesis/Research Project:** assessed separately (major weight for MSc award).

## Semester-wise Course Distribution – M.Sc. Respiratory Technology (Adult Respiratory Care)

### First Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY101** | Leadership & Administration | 1 | 1 | 3 | 5 | 3 |
| **MSC RTY102** | Research Methods & Biostatistics | 2 | 1 | – | 3 | 3 |
| **MSC RTY103** | Pulmonary Rehabilitation | 2 | 2 | 3 | 7 | 5 |
| **MSC RTY104** | Quality & Patient Safety | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY105** | Clinical Practicum I | – | – | 15 | 15 | 5 |
| **Total** | | **7** | **5** | **24** | **36** | **20** |

### Second Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY201** | Teaching & Learning in Health Professions | 2 | – | 6 | 8 | 4 |
| **MSC RTY202** | Cardiopulmonary Physiology & Trauma Care | 2 | – | 6 | 8 | 4 |
| **MSC RTY203** | Evidence-Based Respiratory Care & Presentation Skills – I | 3 | – | – | 3 | 3 |
| **MSC RTY204** | Advanced Mechanical Ventilation | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY205** | Clinical Practicum II | – | – | 15 | 15 | 5 |
| **Total** | | **9** | **1** | **30** | **40** | **20** |

## Third Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | Total Hours | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY301** | Case Management | 2 | – | 6 | 8 | 4 |
| **MSC RTY302** | Polysomnography | 1 | 1 | 3 | 5 | 3 |
| **MSC RTY303** | Critical Care Medicine – I | 2 | 1 | 3 | 6 | 4 |
| **MSC RTY304** | Advanced Procedures | 1 | 1 | 6 | 8 | 4 |
| **MSC RTY305** | Clinical Practicum III | – | – | 15 | 15 | 5 |
| **Total** | | **6** | **3** | **33** | **42** | **20** |

## Fourth Semester

| Course Code | Course Title | Hours/ Week (L) | T | P/CL | RP | Credits |
|---|---|---|---|---|---|---|
| **MSC RTY401** | Evidence-Based Respiratory Care & Presentation Skills – II | 2 | – | 9 | – | 5 |
| **MSC RTY402** | Critical Care Medicine – II | 2 | – | 9 | – | 5 |
| **MSC RTY403** | Thesis / Dissertation | – | – | – | 9 | 3 |
| **MSC RTY404** | Clinical Practicum IV | – | – | 21 | – | 7 |
| **Total** | | **4** | – | **39** | **9** | **20** |

## Program Credit Summary

| Semester | Total Credits |
|---|---|
| First Semester | 20 |
| Second Semester | 20 |
| Third Semester | 20 |
| Fourth Semester | 20 |
| **Total Program Credits** | **80** |

1. Each semester integrates **theory, clinical practice, and research training** for advanced competency in adult respiratory care.
2. **Evidence-Based Respiratory Care & Presentation Skills (I & II)** emphasize literature appraisal, guideline review, data interpretation, and professional communication.
3. **Clinical Practicum (I–IV)** provides progressive supervised clinical training in acute, critical, and rehabilitation settings.
4. **The Thesis/Dissertation (MSC RTY403)** represents the culmination of applied research and evidence-based practice.
5. Successful completion of **all 80 credits** is mandatory for the **award of the M.Sc. Respiratory Technology (Adult Respiratory Care)** degree.

## MSc RT in PAEDIATRIC AND NEONATAL RESPIRATORY CARE

**Semester-wise Distribution of Papers**

**M.Sc. Respiratory Technology – Neonatal and Paediatric Respiratory Care (MSC RTNP)**

### First Semester (Year 1)

| Paper No. | Course Code | Course Title |
|---|---|---|
| Paper I | MSC RTN101 | Leadership & Administration in Respiratory Care |
| Paper II | MSC RTN102 | Research Methods & Biostatistics |
| Paper III | MSC RTN103 | Pulmonary Rehabilitation |
| Paper IV | MSC RTN104 | Quality Improvement & Patient Safety |
| Paper V | MSC RTN105 | Clinical Practicum I |

### Second Semester (Year 1)

| Paper No. | Course Code | Course Title |
|---|---|---|
| Paper VI | MSC RTN201 | Teaching & Learning in Health Professions |
| Paper VII | MSC RTN202 | Cardiopulmonary Physiology & Trauma Care |
| Paper VIII | MSC RTN203 | Evidence-Based Respiratory Care & Presentation Skills – I |
| Paper IX | MSC RTN204 | Advanced Mechanical Ventilation |
| Paper X | MSC RTN205 | Clinical Practicum II |

### Third Semester (Year 2)

| Paper No. | Course Code | Course Title |
|---|---|---|
| Paper XI | MSC RTN301 | Case Management in Neonatal &Paediatric Respiratory Care |
| Paper XII | MSC RTN302 | Polysomnography & Sleep Disorders |
| Paper XIII | MSC RTN303 | Advanced Neonatal Respiratory Care (Including PALS & NALS) |
| Paper XIV | MSC RTN304 | Advanced Diagnostic & Therapeutic Procedures |
| Paper XV | MSC RTN305 | Clinical Practicum III |

**Fourth Semester (Year 2)**

| Paper No. | Course Code | Course Title |
|---|---|---|
| Paper XVI | MSC RTN401 | Evidence-Based Respiratory Care & Presentation Skills – II |
| Paper XVII | MSC RTN402 | Advanced Paediatric Respiratory Care (Including Pulmonology) |
| Paper XVIII | MSC RTN403 | Thesis / Dissertation |
| Paper XIX | MSC RTN404 | Clinical Practicum IV |

1. **Evidence-Based Respiratory Care & Presentation Skills (I & II)** emphasize:
    - Critical review of neonatal and paediatric respiratory care literature
    - Appraisal of clinical guidelines and protocols
    - Research presentation and academic communication skills
2. **Clinical Practicums (I–IV)** provide structured exposure across:
    - Neonatal Intensive Care Units (NICU)
    - Paediatric Intensive Care Units (PICU)
    - Emergency and Pulmonology Departments
3. **Advanced Neonatal and Paediatric Respiratory Care modules** integrate:
    - Neonatal resuscitation (NALS), Paediatric advanced life support (PALS),
    - Ventilation strategies, and
    - Management of congenital and developmental pulmonary disorders.
4. The **Thesis / Dissertation (MSC RTN403)** will focus on a relevant neonatal or paediatric respiratory research area under faculty supervision.
5. Completion of **all 80 credits** and approval of thesis work are mandatory for the **award of M.Sc. Respiratory Technology (Neonatal &Paediatric Respiratory Care)** degree

**First Semester (Year 1) Leadership and Administration**

| Sl. No | Topic | Hours of Study |
|---|---|---|
| 1. | Leadership: An Elusive Concept | 2 Hours |
| 2. | Financial Health, the Taproot of an Organization | 4 Hours |
| 3. | Cultivating the Leadership Relationship | 4 Hours |
| 4. | Learning Organization, the Roots of an Organization | 4 Hours |
| 5. | Building Commitment: Getting Others to Follow | 4 Hours |
| 6. | Operations, the Trunk of an Organization | 4 Hours |
| 7. | Communicating with Clarity | 4 Hours |
| 8. | Strategic Priorities, the Branches of an Organization | 4 Hours |
| 9. | The Art of Effectively Facilitating Processes | 4 Hours |
| 10. | Value Creation, the Leaves and Blossoms of an Organization | 4 Hours |
| 11. | Getting Results | 4 Hours |
| 12. | Developing Others | 4 Hours |
| 13. | Conclusion: Leading in the Future | 4 Hours |

**Biostatistics and Research Methodology**

| Sl. No | Topic | Hours of Study |
|---|---|---|
| 1. | Fundamentals of research: Research Methodology: An Introduction | 2 Hours |
| 2. | Defining the Research Problem | 2 Hours |
| 3. | Research Design Sampling Design | 2 Hours |
| 4. | Measurement and Scaling Techniques | 2 Hours |
| 5. | Methods of Data Collection<br>Processing and Analysis of Data | 2 Hours |
| 6. | Sampling Fundamentals | 2 Hours |
| 7. | Testing of Hypotheses (Parametric or Standard Tests of Hypotheses and non parametric test) | 2 Hours |
| 8. | Interpretation and Report Writing | 2 Hours |
| 9. | Literature survey and documentation | 2 Hours |
| 10. | Data collection, analysis and hypothesis | 2 Hours |
| 11. | Research ethics, plagiarism and impact of research | 2 Hours |
| 12. | Technical writing and reporting of research | 2 Hours |

| Sl. No | Topic | Hours of Study |
|---|---|---|
| 13. | Project cost management | 2 Hours |
| 14. | Measurement and Scaling Techniques | 2 Hours |
| 15. | Funding agencies and research grants | 2 Hours |
| 16. | Declaration of Helsinki | 2 Hours |

**Pulmonary Rehabilitation**

| Sl. No | Topic | Hours of Study |
|---|---|---|
| 1. | Overview of Pulmonary Rehabilitation | 2 Hours |
| 2. | Selecting and assessing pulmonary rehabilitation candidate | 4 Hours |
| 3. | Functional capacity assessment and training | 4 Hours |
| 4. | Collaborative self-management and patient education | 4 Hours |
| 5. | Psychological assessment and intervention | 4 Hours |
| 6. | Nutritional assessment and intervention | 4 Hours |
| 7. | Patient Centred evidence-based outcome | 4 Hours |
| 8. | Disease-specific approaches in pulmonary rehabilitation | 4 Hours |

**Quality and Patient Safety**

| Sl. No | Topic | Hours of Study |
|---|---|---|
| 1 | Measurements the quality of health care | 4 Hours |
| 2 | Quality of care: Definition | 4 Hours |
| 3 | Quality and resource constraints | 4 Hours |
| 4 | Approaches to Quality measurement | 4 Hours |
| 5 | Advances in quality measurement | 4 Hours |
| 6 | Structure, process, and outcome measures of care quality; | 4 Hours |
| 7 | Approaches to developing or selecting measures of care quality for a research project | 4 Hours |
| 8 | Health-related quality of life in different disease conditions COPD, Asthma, | 4 Hours |
| 9 | Quality-of-Life for Respiratory Illness Questionnaire (QOL-RIQ): a disease-specific quality-of-life questionnaire for patients with mild to moderate chronic non-specific lung disease | 4 Hours |
| 10 | Quality of life: Assessment analysis and interpretation | 8 Hours |

## Second Semester (Year 1)

**Teaching and learning in health profession**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | The teacher is important | 2 Hours |
| 2 | The different faces of a good teacher | 2 Hours |
| 3 | Understanding basic educational principles | 2 Hours |
| 4 | Being an enthusiastic and passionate teacher Knowing what works best | 2 Hours |
| 5 | Collaborating and working as a team | 2 Hours |
| 6 | Checking your performance as a teacher and keeping up to date | 2 Hours |
| 7 | The move to an outcome/competency-based approach | 2 Hours |
| 8 | Specifying the learning outcomes and competencies | 2 Hours |
| 9 | Describing and communicating the learning outcomes and competencies | 2 Hours |
| 10 | Implementing an outcome-based approach in practice | 2 Hours |
| 11 | 7KHµDXWKHQWLF¶FXULFXOXP | 2 Hours |
| 12 | Ten questions to ask when planning a curriculum | 2 Hours |
| 13 | Sequencing curriculum content and the spiral curriculum | 2 Hours |
| 14 | Student engagement and a student-centered approach | 2 Hours |
| 15 | Building learning around clinical problems and presentations | 2 Hours |
| 16 | Interprofessional education (IPE)<br>The apprenticeship, community-based education, longitudinal clinical clerkships, and work-based learning<br>Responding to information overload and building | 2 Hours |
| 17 | Recognizing the importance of the educational environment<br>Mapping the curriculum | 2 Hours |
| 18 | Styles of Teaching | 2 Hours |
| 19 | Assessment | 2 Hours |

## Cardiopulmonary Physiology and Trauma Life Support

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Developmental anatomy and Physiology | 4 Hours |
| 2 | Neonatal Respiratory Physiology | 4 Hours |
| 3 | Respiratory Physiology: Ventilation | 1 Hour |
| 4 | Pulmonary function measurements | 1 Hour |
| 5 | The diffusion of pulmonary gases | 1 Hour |
| 6 | Oxygen and carbon dioxide transport | 3 Hours |
| 7 | Acid-base balance and regulation | 3 Hours |
| 8 | Ventilation-perfusion relationships | 1 Hour |
| 9 | Control of ventilation | 1 Hour |
| 10 | Aging and the cardiopulmonary system | 1 Hour |
| 11 | Electric conduction of the heart | 1 Hour |
| 12 | ECG and interpretation | 1 Hour |
| 13 | Exercise and its effect on the cardiopulmonary system | 1 Hour |
| 14 | High altitude and its effect on cardiopulmonary system | 1 Hour |
| 15 | High pressure environment and its effect on Cardiopulmonary system | 1 Hour |
| 16 | ITLS: Initial assessment and management | 2 Hours |
| 17 | Airway and ventilatory management | 2 Hours |
| 18 | Shock | 2 Hours |
| 19 | Thoracic trauma | 2 Hours |
| 20 | Abdominal and pelvic trauma | 2 Hours |
| 21 | Head trauma | 2 Hours |
| 22 | Spine and spinal cord trauma | 2 Hours |
| 23 | Musculoskeletal trauma | 2 Hours |
| 24 | Thermal injuries | 2 Hours |
| 25 | Pediatric trauma | 2 Hours |

**Evidence-Based Respiratory Care & Presentation Skills – I**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Journal article from Critical Care | 4 Hours |
| 2 | Journal article from Respiratory Technology | 4 Hours |
| 3 | Journal article from Respiratory Technology | 4 Hours |
| 4 | Journal article from Trauma and emergency | 4 Hours |
| 5 | Journal article from IJRC | 4 Hours |
| 6 | Journal article from Neonatal Respiratory Care | 4 Hours |

**Advanced Mechanical Ventilation**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Historical perspective on the development of mechanical ventilation | 2 Hours |
| 2 | Conventional methods of ventilatory support | 4 Hours |
| 3 | Alternative methods of ventilatory support:<br>Volume assured pressure support ventilation, Proportional assist ventilation (PAV), Neurally adjusted ventilatory assist (NAVA), Adaptative support ventilation (ASV) | 4 Hours |
| 4 | Noninvasive methods of ventilator support | 4 Hours |
| 5 | Unconventional methods of ventilator support | 4 Hours |
| 6 | Ventilator support in special settings | 4 Hours |
| 7 | Physiological effect of mechanical ventilation | 4 Hours |
| 8 | Artificial airways and management | 4 Hours |
| 9 | Complications in ventilator supported patients | 4 Hours |
| 10 | Monitoring in ventilator support patients | 4 Hours |
| 11 | Management of ventilator support patients | 4 Hours |
| 12 | Adjunctive Therapy | 4 Hours |
| 13 | Neonatal Ventilation | 5 Hours |

## Third Semester (Year 2)

### Case Management

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | The Evolution of Case Management Practice | |
| 2 | Overview of Case Management Practice | |
| 3 | The Roles of a Case Manager | |
| 4 | An Example of Case Management | |
| 5 | CASE MANAGEMENT SKILLS<br>Interpersonal, Connecting, and Information- Gathering Skills | |
| 6 | Specialized Practice Skills | |
| 7 | Additional Components of Case Management Intervention and Evaluation | |
| 8 | RT Case Management | |
| 9 | Case Management Issues with Special Populations | |
| 10 | Challenges and Visions | |

### Polysomnography

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Sleep across life cycle | 2 Hours |
| 2 | Anatomy and physiology pertaining to sleep | 2 Hours |
| 3 | Patient care and education | 2 Hours |
| 4 | Sleep Questionnaires | 2 Hours |
| 5 | Sleep disorders | 2 Hours |
| 6 | Polysomnography instrumentation | 2 Hours |
| 7 | Home sleep studies | 2 Hours |
| 8 | Scoring of sleep studies adult and paediatric | 2 Hours |
| 9 | Treatment of sleep disorders | 2 Hours |
| 10 | PAP therapy | 2 Hours |
| 11 | Sleep Hygiene | 2 Hours |
| 12 | Cognitive Behavioural Therapy | 2 Hours |
| 13 | Report generation | 2 Hours |
| 14 | Cognitive behavioural therapy in insomnia | 2 Hours |
| 15 | Psychiatric disorders of sleep and treatment | 2 Hours |

## Advanced Neonatal Respiratory Care including PALS and NALS

| Sl. No. | Topic | Hours |
|---|---|---|
| **Part I - Lung Development and Maldevelopment** | | |
| 1 | Development of the respiratory system | 2 Hours |
| 2 | Developmental lung anomalies | 2 Hours |
| **Part II- Principles of mechanical ventilation** | | |
| 3 | Spontaneous breathing | 2 Hours |
| 4 | Pulmonary gas exchange | 2 Hours |
| 5 | Oxygen therapy | 2 Hours |
| 6 | Oxygen toxicity | 2 Hours |
| 7 | Pulmonary mechanics | 2 Hours |
| 8 | Basic principles of mechanical ventilation | 2 Hours |
| 9 | Classification of mechanical ventilation | 2 Hours |
| 10 | Ventilator parameters | 2 Hours |
| 11 | Respiratory gas conditioning and humidification | 2 Hours |
| **Part III -Procedures and techniques** | | |
| 12 | Clinical examination | 2 Hours |
| 13 | Neonatal resuscitation | 2 Hours |
| 14 | Laryngoscopy and endotracheal intubation | 2 Hours |
| 15 | Vascular access | 2 Hours |
| 16 | Tracheostomy | 2 Hours |
| **Part IV - Monitoring the ventilated patient** | | |
| 17 | Continuous monitoring techniques | 2 Hours |
| 18 | Pulse oximetry | 2 Hours |
| 19 | Interpretation of blood gases | 2 Hours |
| 20 | Neonatal pulmonary graphics | 2 Hours |
| 21 | Radiography | 2 Hours |
| 22 | Transillumination | 2 Hours |
| 23 | Echocardiography | 2 Hours |
| 24 | Bronchoscopy | 2 Hours |

| Sl. No. | Topic | Hours |
|---|---|---|
| **Part V - Non-invasive ventilatory techniques** | | |
| 25 | Nasal cannula therapy | 2 Hours |
| 26 | Continuous positive airway pressure | 2 Hours |
| 27 | Non-invasive ventilation | 2 Hours |
| **Part VI - Ventilatory modes and modalities** | | |
| 28 | Positive end-expiratory pressure, Intermittent mandatory ventilation<br>Synchronized intermittent mandatory, Assist/Control ventilation, Volume-targeted ventilation, pressure control ventilation, pressure support ventilation, Proportional assist ventilation | 2 Hours |
| **Part VII -High-frequency ventilation** | | |
| 29 | High-frequency ventilation: General concepts | 2 Hours |
| 30 | High-frequency jet ventilation | 2 Hours |
| **Part VIII -Commonly used neonatal ventilators** | | |
| 31 | VIP bird gold ventilator | 2 Hours |
| 32 | AVEA ventilator | 2 Hours |
| 33 | Bear cub 750 | 2 Hours |
| 34 | Newport wave | 2 Hours |
| 35 | Newport e360 | 2 Hours |
| 36 | Drager babylog VN500 infant and pediatric ventilator | 2 Hours |
| 37 | SERVO-I ventilator and neurally adjusted ventilatory assist (NAVA) | 2 Hours |
| 38 | SLE5000 and SLE4000 infant ventilators | 2 Hours |
| 39 | Bunnell life pulse high frequency jet ventilator | 2 Hours |
| 40 | Sensormedics 3100A high frequency oscillatory ventilator | 2 Hours |
| **Part IX -Adjunctive therapies** | | |
| 41 | Hemodynamic support | 2 Hours |
| 42 | Nutritional support of the ventilated infant | 2 Hours |
| 43 | Surfactant replacement therapy | 2 Hours |
| 44 | Pharmacologic agents | 2 Hours |
| 45 | automatic control of oxygen delivery | 2 Hours |
| 46 | Sedation and analgesia | 2 Hours |
| 47 | Inhaled nitric oxide therapy | 2 Hours |

| Sl. No. | Topic | Hours |
|---|---|---|
| 48 | Extracorporeal membrane oxygenation | 2 Hours |
| 49 | Liquid ventilation for neonatal respiratory failure | 2 Hours |
| **Part X -Management of common neonatal respiratory diseases** | | |
| 50 | Mechanisms of respiratory failure | |
| 51 | Tissue hypoxia | 2 Hours |
| 52 | Indications for mechanical ventilation | 2 Hours |
| 53 | Respiratory distress syndrome | 2 Hours |
| 54 | Pneumonia | 2 Hours |
| 55 | Meconium aspiration syndrome | 2 Hours |
| 56 | Persistent pulmonary hypertension of the newborn | 2 Hours |
| 57 | Congenital diaphragmatic hernia | 2 Hours |
| 58 | Pulmonary hypoplasia | 2 Hours |
| 59 | Apnea Syndromes | 2 Hours |
| 60 | Weaning and extubation | 2 Hours |
| **Part XI - Bronchopulmonary dysplasia** | | |
| 61 | Etiology and pathogenesis | 2 Hours |
| 62 | Long-Term outcome of new borns with bronchopulmonary dysplasia | 2 Hours |
| **Part XII - Complications associated with mechanical ventilation** | | |
| 63 | Thoracic air leaks | 2 Hours |
| 64 | Patent ductus arteriosus | 2 Hours |
| 65 | Neonatal pulmonary hermorrhage | 2 Hours |
| 66 | Retinopathy of prematurity | 2 Hours |
| 67 | Neurologic complications of mechanical ventilation | 2 Hours |

## Pediatric Advanced Life Support

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Basic Life Support in Infants & Children | 2 Hours |
| 2 | Systematic Approach to a seriously ill or injured Child | 2 Hours |
| 3 | Recognizing and Managing Cardiac Arrest | 2 Hours |
| 4 | Recognition and Management of Respiratory Distress and Failure | 4 Hours |
| 5 | Recognition and Management of Shock | 3 Hours |
| 6 | Recognition and Management of Arrhythmias | 2 Hours |
| 7 | Post Cardiac Arrest Care | 1 Hours |
| 8 | Neonatal Advanced Life Support (NALS), NRP | 8 Hours |

## Advanced Procedures

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Arterial Puncture for ABG | 2 Hours |
| 2 | Arterial cannulation | 2 Hours |
| 3 | Venous cannulation | 2 Hours |
| 4 | Chest tube insertion, aspiration, repositioning, and removal | 4 Hours |
| 5 | Bronchoscopic tissue sample for the purpose of bronchoalveolar lavage and endobronchial brushing. | 4 Hours |
| 6 | Chest X Ray | 4 Hours |
| 7 | Lung Ultrasound | 6 Hours |
| 8 | CT Chest | 4 Hours |
| 9 | PFT basic and Advanced | 5 Hours |
| 10 | Polysomnography | 5 Hours |
| 11 | Airway management techniques | 5 Hours |
| 12 | Basic Life Support | 5 Hours |
| 13 | Advanced cardiac Life support | 5 Hours |
| 14 | Extra Corporeal Membrane Oxygenation | 5 Hours |

## Fourth Semester (Year 2)

### Advanced Pediatric Respiratory Care including Pulmonology

| Sl. No. | Name of the Topic | Hours |
|---|---|---|
| 1 | Pediatric Airway Anatomy & Physiology | 1 |
| 2 | Diagnostic Techniques in Children:<br>Chest X Ray<br>Arterial Blood Gas<br>Lung Ultrasonography<br>Flexible Bronchoscopy | 6 |
| 3 | Pediatric Airway Management | 2 |
| 4 | Pulmonary Function Testing in Children | 2 |
| 5 | Pediatric Sleep Disorders | 1 |
| 6 | Pediatric Polysomnography | 1 |
| 7 | PARDS | 2 |
| 8 | NIPPV in pediatric patients | 2 |
| 9 | Pediatric Airway Disorders:<br>Diseases causing supralaryngeal obstruction, Croup, Epiglottitis, Bacterial Tracheitis, Tracheomalacia, Tracheal & Bronchial Stenosis, Bronchiectasis, Acute Bronchiolitis etc. | 3 |
| 10 | Parenchymal Lung diseases: Pneumonia, Tuberculosis, Sickle cell disease, Recurrent aspiration syndrome | 2 |
| 11 | Pediatric Asthma | 2 |
| 12 | Cystic Fibrosis | 1 |
| 13 | Pediatric Trauma | 2 |
| 14 | Neurological & Neuromuscular disorders | 3 |
| 15 | Airway Clearance & Hyperinflation Therapy in Pediatrics | 2 |
| 16 | Diseases of Pleura | 2 |

| Sl. No. | Name of the Topic | Hours |
|---|---|---|
| 17 | Pediatric Cardiorespiratory Care:<br>Pre Operative Management in Congential Heart Diseases: (Left to Right Shunt lesions, Obstructive Lesions, CCHD) Post op management in cardiac lesions:<br>, PA Banding, Bidirectional Glenn, ALCAPA repair, Fontan | 4 |
| | ASD Closure | 1 |
| | VSD Closure | 1 |
| | CoA Repair | 1 |
| | TAPVC repair | 1 |
| | ASO | 1 |
| | BT Shunt | 1 |
| | PA Banding | 1 |
| | Bidirectional Glenn | 1 |
| | ALCAPA repair | 1 |
| | Fontan | 1 |
| 18 | Meningitis | 1 |
| 19 | Transport of Infants & Children | 1 |
| 20 | Home Care | 1 |
| 21 | Pediatric ECMO | 2 |

## Evidence-Based Respiratory Care & Presentation Skills – II

### Course Description

This course emphasizes journal reading, critical appraisal, and professional presentation skills. It aims to enhance students' ability to interpret current research evidence in respiratory care and effectively communicate findings through oral and poster presentations.

### Course Objectives

By the end of the course, students will be able to:

4. Critically read and interpret respiratory care research articles.
5. Present journal reviews effectively in academic and professional forums.
6. Develop confidence in oral and poster presentations.

**Detailed Syllabus**

| Sl. No. | Topic | Hours |
|---|---|---|
| 1 | Introduction to Evidence-Based Respiratory Care – Recap of key principles | 3 |
| 2 | Journal selection and literature search (PubMed, Google Scholar) | 4 |
| 3 | Components of a research article – IMRaD structure | 4 |
| 4 | Critical reading and appraisal of journal articles | 8 |
| 5 | Preparing journal presentations – format, slides, summary writing | 6 |
| 6 | Oral presentation techniques and scientific communication | 6 |
| 7 | Poster preparation and presentation practice | 6 |
| 8 | Peer review, group discussions, and feedback sessions | 8 |

**Teaching and Learning Methods**

- Journal club presentations
- Group discussions and peer review
- Guided reading and appraisal sessions
- Faculty feedback and mentoring

**Assessment Pattern**

| Component | Weightage |
|---|---|
| Journal Presentation (Oral) | 40% |
| Poster Presentation | 20% |
| Journal Appraisal Report | 20% |
| Class Participation & Feedback | 20% |

**Suggested Readings**


1. Straus S.E. et al. *Evidence-Based Medicine: How to Practice and Teach EBM*.
2. Guyatt G. et al. *Users' Guides to the Medical Literature*.
3. Selected articles from *Respiratory Care Journal*, *Chest*, *Critical Care Medicine*, and *ATS Journals*.

## SCHEME OF EXAMINATION

**M.Sc. Respiratory Technology – Adult Respiratory Care (MSC RTA) Degree Examination**

| Paper No. | Course Code | Course Title | Theory (Written) | Internal | Oral/ Viva | Practical/ Project | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|---|
| **First Semester (Year 1)** | | | | | | | | **500** |
| Paper I | MSC RTA101 | Leadership & Administration in Respiratory Care | 50 | 25 | 25 | – | 100 | |
| Paper II | MSC RTA102 | Research Methods & Biostatistics | 70 | 10 | 20 | – | 100 | |
| Paper III | MSC RTA103 | Pulmonary Rehabilitation | 70 | 10 | 20 | – | 100 | |
| Paper IV | MSC RTA104 | Quality Improvement & Patient Safety | 50 | 25 | 25 | – | 100 | |
| Paper V | MSC RTA105 | Clinical Practicum I | – | 50 | 50 | – | 100 | |
| **Second Semester (Year 1)** | | | | | | | | **500** |
| Paper VI | MSC RTA201 | Teaching & Learning in Health Professions | 50 | 25 | 25 | – | 100 | |
| Paper VII | MSC RTA202 | Cardiopulmonary Physiology & Trauma Care | 70 | 10 | 20 | – | 100 | |
| Paper VIII | MSC RTA203 | Evidence-Based Respiratory Care & Presentation Skills – I | 50 | 25 | 25 | – | 100 | |
| Paper IX | MSC RTA204 | Advanced Mechanical Ventilation | 70 | 10 | 20 | – | 100 | |
| Paper X | MSC RTA205 | Clinical Practicum II | – | 25 | 25 | 50 | 100 | |
| **Third Semester (Year 2)** | | | | | | | | **500** |
| Paper XI | MSC RTA301 | Case Management in Adult Respiratory Care | 50 | 25 | 25 | – | 100 | |
| Paper XII | MSC RTA302 | Polysomnography & Sleep Disorders | 70 | 10 | 20 | – | 100 | |
| Paper XIII | MSC RTA303 | Critical Care Medicine – I | 70 | 10 | 20 | – | 100 | |

| Paper No. | Course Code | Course Title | Theory (Written) | Internal | Oral/ Viva | Practical/ Project | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|---|
| Paper XIV | MSC RTA304 | Advanced Diagnostic & Therapeutic Procedures | 70 | 10 | 20 | – | 100 | |
| Paper XV | MSC RTA305 | Clinical Practicum III | – | 50 | 50 | – | 100 | |
| **Fourth Semester (Year 2)** | | | | | | | | **400** |
| Paper XVI | MSC RTA401 | Evidence-Based Respiratory Care & Presentation Skills – II | 70 | 10 | 20 | – | 100 | |
| Paper XVII | MSC RTA402 | Critical Care Medicine – II | 70 | 10 | 20 | – | 100 | |
| Paper XVIII | MSC RTA403 | Thesis / Dissertation | – | – | – | 100 | 100 | |
| Paper XIX | MSC RTA404 | Clinical Practicum IV | – | 25 | 25 | 50 | 100 | |
| **Total Marks** | | | | | | | | **1900** |

## SCHEME OF EXAMINATION

**M.Sc. Respiratory Technology – Neonatal and Paediatric Respiratory Care (MSC RTN) Degree Examination**

| Paper No. | Course Code | Course Title | Theory (Written) | Internal | Oral/ Viva | Practical / Project | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|---|
| **First Semester (Year 1)** | | | | | | | | **500** |
| Paper I | MSC RTN101 | Leadership & Administration in Respiratory Care | 50 | 25 | 25 | – | 100 | |
| Paper II | MSC RTN102 | Research Methods & Biostatistics | 70 | 10 | 20 | – | 100 | |
| Paper III | MSC RTN103 | Pulmonary Rehabilitation | 70 | 10 | 20 | – | 100 | |
| Paper IV | MSC RTN104 | Quality Improvement & Patient Safety | 50 | 25 | 25 | – | 100 | |
| Paper V | MSC RTN105 | Clinical Practicum I | – | 50 | 50 | – | 100 | |

| Paper No. | Course Code | Course Title | Theory (Written) | Internal | Oral/ Viva | Practical / Project | Subject Total | Semester Total |
|---|---|---|---|---|---|---|---|---|
| **Second Semester (Year 1)** | | | | | | | | **500** |
| Paper VI | MSC RTN201 | Teaching & Learning in Health Professions | 50 | 25 | 25 | – | 100 | |
| Paper VII | MSC RTN202 | Cardiopulmonary Physiology & Trauma Care | 70 | 10 | 20 | – | 100 | |
| Paper VIII | MSC RTN203 | Evidence-Based Respiratory Care & Presentation Skills – I | 50 | 25 | 25 | – | 100 | |
| Paper IX | MSC RTN204 | Advanced Mechanical Ventilation | 70 | 10 | 20 | – | 100 | |
| Paper X | MSC RTN205 | Clinical Practicum II | – | 25 | 25 | 50 | 100 | |
| **Third Semester (Year 2)** | | | | | | | | **500** |
| Paper XI | MSC RTN301 | Case Management in Neonatal & Paediatric Respiratory Care | 50 | 25 | 25 | – | 100 | |
| Paper XII | MSC RTN302 | Polysomnography & Sleep Disorders | 70 | 10 | 20 | – | 100 | |
| Paper XIII | MSC RTN303 | Advanced Neonatal Respiratory Care (Including PALS & NALS) | 70 | 10 | 20 | – | 100 | |
| Paper XIV | MSC RTN304 | Advanced Diagnostic & Therapeutic Procedures | 70 | 10 | 20 | – | 100 | |
| Paper XV | MSC RTN305 | Clinical Practicum III | – | 50 | 50 | – | 100 | |
| **Fourth Semester (Year 2)** | | | | | | | | **400** |
| Paper XVI | MSC RTN401 | Evidence-Based Respiratory Care & Presentation Skills – II | 70 | 10 | 20 | – | 100 | |
| Paper XVII | MSC RTN402 | Advanced Paediatric Respiratory Care (Including Pulmonology) | 70 | 10 | 20 | – | 100 | |
| Paper XVIII | MSC RTN403 | Thesis / Dissertation | – | – | – | 100 | 100 | |
| Paper XIX | MSC RTN404 | Clinical Practicum IV | – | 25 | 25 | 50 | 100 | |
| **Total Marks** | | | | | | | | **1900** |

## Pattern of Question Papers

**Pattern A – 70 Marks (3 Hours)**

| Type of Question | Number | Marks Each | Total Marks |
|---|---|---|---|
| Structured Essay | 2 out of 3 | 15 | 30 |
| Short Notes | 5 out of 6 | 5 | 25 |
| Short Answers | 5 out of 7 | 3 | 15 |
| **Total** | | | **70 Marks** |

**Pattern B – 50 Marks (2 Hours)**

| Type of Question | Number | Marks Each | Total Marks |
|---|---|---|---|
| Structured Essay | 2 out of 2 | 10 | 20 |
| Short Notes | 3 out of 5 | 5 | 15 |
| Short Answers | 5 out of 7 | 3 | 15 |
| **Total** | | | **50 Marks** |

NATIONAL COMMISSION FOR ALLIED AND HEALTHCARE PROFESSIONS
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# Chapter-6

# PhD Program in Respiratory Technology

The PhD in Respiratory Technology is designed to advance knowledge in the field by developing and applying sophisticated research methodologies. It equips scholars with the ability to conduct independent, in-depth research, leading to innovations in respiratory care practices, health policy, and the comprehensive understanding of respiratory health and disease. The program emphasizes the dissemination of research findings to improve patient care and strengthen the profession.

**Purpose**

The purpose of the PhD in Respiratory Technology is to develop leaders and researchers who advance the profession through innovative research, evidence-based practice, and improved patient outcomes. The program prepares scholars to conduct independent research, influence respiratory care policy, and lead transformative changes in clinical practice and education.

**Objectives**

(i) **Knowledge Creation**

Conduct original research that advances the scientific and clinical understanding of Respiratory Technology.

(ii) **Advanced Methods**

Apply quantitative, qualitative, and mixed-methods research approaches to investigate complex respiratory conditions and treatments.

(iii) **Dissemination**

Communicate research findings through peer-reviewed publications and conference presentations to impact clinical practice and policy.

(iv) **Leadership and Innovation**

Lead research projects, develop innovative care programs, and contribute to the growth of the Respiratory Technology profession and advanced practice roles.

(v) **Clinical Application**

Translate research into evidence-based interventions that improve patient care and clinical outcomes.

(vi) **Professional Development**

Foster critical thinking, ethical research conduct, and lifelong learning to sustain contributions to respiratory care advancement.

## Define guide/co-guide policy (caps per rank; same-university guide/ limits).

i. **Eligibility of Guide / Co-Guide**

- A Guide must hold a PhD degree in the relevant discipline and be a regular faculty member of the institution.
- A Guide should preferably be an Associate Professor or Professor with a minimum of 5 years of teaching/research experience after PhD with 3 first author publications
- A guide must be a registered guide as per the norms of the institution.
- The Co-Guide can be from the same institution or an external institution, provided they have a PhD and relevant research experience.

ii. **Number of Scholars per Guide / Co-Guide**

- A faculty member may guide a maximum of **8 PhD scholars in total**, including those in the role of Guide and Co-Guide.
- Out of these, a maximum of **6 scholars can be under the same faculty member as the primary Guide at any given time**.
- A faculty member can serve as **Co-Guide for up to 2 additional PhD scholars**.

iii. **Same-University Guide Requirement**

- At least one of the Guide or Co-Guide must be a regular, full-time faculty member of the university where the candidate is registered for the PhD program.
- The Co-Guide may be from another UGC-recognized academic institution or research organization, subject to approval by the university's Research Degree Committee (RDC).

iv. **Change of Guide / Co-Guide**

- Any change of Guide or Co-Guide during the PhD program must be approved by the Research Degree Committee, with a valid reason (such as retirement, transfer, resignation, or change in research focus), while ensuring compliance with UGC guidelines.

v. **Additional Considerations**

- The Guide and Co-Guide must not have any conflict of interest and must commit to providing proper academic supervision throughout the duration of the PhD.
- A mandate to regular progress monitoring and annual review of the research work, which the Guide and Co-Guide are responsible for.

## Guide Eligibility and Supervision Policy

### 1. Eligibility Criteria for Research Guides

To ensure quality supervision and academic rigor in doctoral research, the eligibility for recognition as a Ph.D. Guide / Supervisor in **Respiratory Technology** shall be as follows:

| Criterion | Requirement |
|---|---|
| **Academic Qualification** | Ph.D. in Respiratory Technology / Critical Care / Pulmonology / Allied Health Sciences / Physiology / Life Sciences / Biomedical Sciences from a recognized university. |
| **Professional Background** | Minimum of **8 years of teaching and/or clinical research experience** in Respiratory Technology, Critical Care, or related allied health disciplines. |
| **Research Publications** | At least **three (3)** publications in **peer-reviewed and indexed journals** (Scopus, PubMed, Web of Science, or UGC-CARE) in relevant areas of Respiratory Technology, Pulmonology, or Critical Care within the last **five years**. |
| **Academic Position** | Should hold the post of **Associate Professor or above**, in a recognized institution/university department approved for Ph.D. supervision. |
| **Institutional Affiliation** | Must be affiliated with a university or research institution recognized by the **NCAHP / UGC / MoHFW** for doctoral studies. |
| **Ethics & Integrity Compliance** | Must not be under any academic or administrative disciplinary proceedings; must comply with research ethics and institutional regulations. |

### 2. Co-Guide (Joint Supervision)

- A **Co-Guide** may be appointed from another allied discipline such as Pulmonology, Anaesthesiology, Physiology, Biomedical Engineering, or Data Science, when the research requires multidisciplinary expertise.
- The Co-Guide must hold a **Ph.D., MD or equivalent research qualification** in a related area with relevant publications.
- The role of Co-Guide must be formally approved by the **Doctoral Research Committee (DRC)**.

### 3. Supervision Capacity

| Category | Maximum Number of Ph.D. Candidates |
|---|---|
| Professor | 6 Scholars |
| Associate Professor | 4 Scholars |
| Assistant Professor (Ph.D. holder with ≥3 years post-doctoral experience) | 2 Scholars |

*No faculty member shall guide more than the prescribed number of candidates at any given time across all universities*.

**4. Age Limit for Recognition**

- Normally, faculty up to the age of **70 years** shall be eligible for Ph.D. supervision.
- Guides above 70 years may continue **joint supervision** with a recognized co-guide, subject to institutional and Academic Council approval.

**5. Duration of Recognition**

- Recognition as a Ph.D. Guide shall remain valid for **five (5) years**, subject to renewal based on continuing research activity and publication record.

**6. Guide Responsibilities**

1. Ensure scientific rigor, research ethics, and compliance with NCAHP and university regulations.
2. Facilitate regular progress reviews through the **Doctoral Research Committee (DRC)**.
3. Encourage scholarly publication and conference dissemination of research outcomes.
4. Maintain documentation of research progress, plagiarism checks, and submission timelines.
5. Guide scholars in research design, data analysis, and thesis preparation with integrity and academic mentorship.

**7. Revocation or Suspension of Guide Recognition**

Recognition may be suspended or withdrawn by the university / NCAHP in cases of:

- Proven academic misconduct, plagiarism, or ethical violations;
- Non-compliance with supervision norms;
- Dereliction of duties or extended inactivity in research.

**8. Approval Authority**

All appointments and recognitions of Ph.D. Guides in Respiratory Technology shall be approved by the **Doctoral Research Committee (DRC)** and ratified by the **Academic Council**, in accordance with NCAHP and UGC Ph.D. Regulations (2022).

## 4. Research Scholars

### 4.1 Full-Time Scholars

Full-time Research Scholars are those who register for a Ph.D. on a full-time basis with the University, are not employed elsewhere, and dedicate themselves entirely to pursuing their research on campus. They may receive financial support in the form of scholarships from the University, UGC, AICTE, or any other sponsoring institute/agency to cover research and living expenses. Alternatively, they may be non-stipendiary scholars who sustain themselves independently while carrying out their research full-time on campus.

### 4.2 Part-Time Scholars

#### 4.2.1 Part-time Internal Scholars

Part-time Internal Candidates are those who are employed full-time in any department at the University/ Industry/ Hospital and are permitted to pursue Ph.D.

#### 4.2.2 Part-time external scholars

Candidates employed full-time in educational institutions, industry, or research organizations may be permitted to pursue their Ph.D. with the University as part-time scholars. They will conduct their research under the guidance of anthe University's Ph.D. Supervisor and are required to complete the prescribed credit requirements for Ph.D. coursework. Additionally, they must comply with the University's procedures for monitoring research progress and adhere fully to all rules and regulations of the Ph.D. programme. Furthermore, the employer must provide an undertaking to relieve the candidate for completion of the coursework, and the candidate is required to submit a No Objection Certificate (NOC) from their organization.

### 4.3 Eligibility

The candidate must fulfill one of the following criteria to seek admission. Candidates with foreign degrees equivalent to MSC RT/ Masters in any discipline.

#### 4.3.1 Master's Degree Holders

1. Candidates with a 1-year (2-semester) Master's after a 4-year (8-semester) Bachelor's degree, or a 2-year (4-semester) Master's after a 3-year Bachelor's degree, or equivalent qualifications recognized by the statutory regulatory body.
2. Must have at least 55% marks or equivalent grade.
3. Relaxation of 5% marks/grade is allowed for SC/ST/OBC (non-creamy layer)/Differently-Abled/EWS and other categories as per Commission rules.

#### 4.3.2 M.Phil. Degree Holders

1. Candidates who have completed an M.Phil. programme with at least 55% marks or equivalent grade.
2. The same 5% relaxation applies for reserved categories and EWS, as per Commission norms.

## 5 Ph.D. Admission Procedure and Course work

### 5.1 General Criteria

1. Admissions are based on institutional guidelines in line with UGC and other statutory/regulatory norms.
2. Reservation policies of the Central/State Government will be followed.

### 5.2 Admission Methods

1. Candidates qualifying in national-level exams such as UGC-NET, CSIR-NET, GATE, CEED, or equivalent may be admitted based on an interview.
2. Institutions may also conduct their own Entrance Test, with the syllabus divided into:
   a. 50% Research Methodology
   b. 50% Subject-specific content
3. Candidates must score at least 50% in the entrance test to be eligible for the interview (with 5% relaxation for SC/ST/OBC (non-creamy layer)/EWS/Persons with Disabilities).
4. Selection based on entrance test will consider 70% entrance test score and 30% interview/viva voce performance.
5. The number of students called for the interview may depend on seat availability.

### 5.3 Institutional Responsibilities

1. Publish a prospectus in advance on the institution's website, clearly stating:
   a. Number of seats (discipline-wise)
   b. Admission criteria and procedure
   c. Reservation details
2. Maintain and display a list of Ph.D. Supervisors (name, designation, department/centre) and details of registered Ph.D. scholars (name, research topic, date of admission).

### 5.4 Course Duration (Gazette 2022 )

1. The Ph.D. Scholar shall complete the programme in a minimum duration of 3 years (including coursework) and a maximum duration of 6 years from the date of admission.
2. An extension of up to 2 additional years may be granted through re-registration, as per the Statute/Ordinance of the Higher Educational Institution. However, the total duration cannot exceed 8 years from the date of admission.
3. Female Ph.D. scholars and Persons with Disabilities (with more than 40% disability) are eligible for an additional relaxation of 2 years, subject to a maximum duration of 10 years from the date of admission.
4. Female Ph.D. scholars may also avail Maternity Leave/Child Care Leave for up to 240 days during the entire duration of the Ph.D. programme.

### 5.5 Coursework Milestones

#### 5.5.1 Credit Requirement

1. Minimum of 12 credits, including:
    a. Research and Publication Ethics (UGC-mandated course)
    b. Research Methodology
2. The Research Advisory Committee may recommend UGC-recognized online courses as part of credit fulfillment.

#### 5.5.2 Training Component

1. All Ph.D. scholars must undergo training in teaching, pedagogy, and academic writing related to their subject.
2. They may be assigned 4–6 hours/week of teaching or research assistantship, including tutorials, lab work, or evaluations.

#### 5.5.3 Minimum Standards

1. A scholar must secure at least 55% marks (or equivalent grade on the UGC 10-point scale) in coursework to continue in the programme and qualify to submit the thesis.

#### 5.5. 4 Thesis Submission & Evaluation

**Post-Coursework Research**

After completing coursework with the required grades, the scholar must undertake research and prepare a draft thesis.

**Progress Report**

Submission Frequency

1. Every candidate must submit a half-yearly progress report through their supervisor after provisional registration.
2. Reports are due for the periods Jan–June and July–Dec. The first report will align with the next reporting cycle (June or December).

**Report Content**

Each progress report should include:

1. Review of literature progress
2. New data collected or theoretical/technical developments
3. Progress in research methodology/standardization
4. Discussion of work completed

**Non-Compliance**

1. Failure to submit two consecutive reports on time will result in automatic cancellation of provisional registration.
2. If two consecutive reports are unsatisfactory, the Board/Committee may recommend cancellation of registration to the University.

**Pre-Submission Presentation**

Before submission, the scholar presents their work before the Research Advisory Committee (RAC), in a session open to faculty and fellow scholars.

**Plagiarism & Integrity**

1. Institutions must use plagiarism-detection software.
2. Research integrity is mandatory throughout.

**Thesis Submission Requirements**

Thesis must be submitted with:

1. An undertaking by the scholar declaring no plagiarism.
2. A certificate from the supervisor confirming originality and non-submission elsewhere.

**Evaluation Process**

1. Thesis is evaluated by the supervisor and two external experts (not employed by the institution, with strong academic credentials).
2. One examiner, where possible, should be from outside India.
3. The viva-voce board includes the supervisor and at least one external examiner; it may be conducted online and is open to RAC, faculty, and scholars.

**Timeline**

The entire evaluation process, including viva-voce and declaration of results, must be completed within 6 months of thesis submission.

## 6. Specify outputs (publications, conference presentations) and viva/defense steps.

### 6.1 Publications

The Ph.D. scholar is required to publish two scientific papers related to their thesis in accredited national or international journals indexed in SCOPUS, Web of Science (WoS), PubMed, or UGC-CARE. Additionally, the scholar must present two scientific papers based on their thesis work at national or international conferences.

### 6.2 Viva-Voce Conditions

1. Viva is conducted only if both external examiners recommend acceptance (after corrections if required).
2. If one examiner rejects, a new external examiner is appointed.
3. If the alternate examiner also rejects, the thesis is rejected, and the scholar is declared ineligible.

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# Chapter-7

# Job Descriptions

## 7.1 Catalogue of Roles Across Levels

- **Clinical Practice**
  - Respiratory Therapist (BSc RT graduate)
  - Senior/Advanced Respiratory Therapist (MSC RT graduate)
  - Clinical Specialist (Fellowship or PhD trained)
  - Consultant Respiratory Therapist (MSc/ PhD + leadership)
- **Academic**
  - Tutor/Demonstrator
  - Lecturer/Assistant Professor
  - Associate Professor
  - Professor/Chair of Respiratory Technology
- **Research**
  - Research Assistant/Fellow
  - Principal Investigator
  - Research Supervisor/PhD Guide
- **Administrative/Leadership**
  - Clinical Coordinator
  - Program Director (BSc RT/MSc. RT)
  - Department Head
  - Professional Body Office Bearer

## 7.2 Job Roles Across Levels

| Level | Typical Roles | Purpose | Settings | Qualification |
|---|---|---|---|---|
| **BSC RT Graduate** | Junior Respiratory Therapist, PFT Technician, Sleep Lab Technician | Provide frontline care, perform routine diagnostics, support emergency response | ICU, NICU, ED, Pulmonary Function Labs, Sleep Labs | BSC RT (3 years + 1-year internship) |
| **MSC RT Graduate** | Senior RT, Assistant Professor, ECMO Specialist | Independent advanced practice, subspecialty interventions, teaching & mentorship | Critical Care Units, Academia, Research Labs | MSC RT (2 years post-BSC RT) |

| Level | Typical Roles | Purpose | Settings | Qualification |
|---|---|---|---|---|
| **Fellowship (post-MSC RT)** | Clinical Specialist (ECMO, Sleep Medicine, Pulmonary Rehab) | Subspecialty expertise, leadership in advanced interventions | Tertiary ICUs, Specialty Clinics, Research Units | MSC RT + Fellowship Certification |
| **PhD Graduate** | Researcher, Clinical Field Specialist, Professor/ Chair | Generate new knowledge, lead policy and guideline development, train faculty | Universities, Research Institutes, Policy/Professional Bodies | PhD (Respiratory Technology/ Allied Health) |

### 7.3 Competency Mapping

Each role will be mapped to **knowledge, skills, and attitudes (KSAs):**

| Role | Typical Setting | Knowledge | Skills | Attitudes |
|---|---|---|---|---|
| **BSC RT Graduate** | Tertiary hospitals, community centers | Fundamentals of cardio-pulmonary science, acute care protocols | Basic ventilator management, oxygen therapy, airway clearance | Ethical, safe, patient-centered |
| **MSC RT Graduate** | ICUs, specialized clinics, academia | Advanced pathophysiology, teaching methodology, research methods | Complex ventilator modes, NIV, teaching, basic research | Leadership, reflective practice |
| **PhD Graduate** | Academic, research institutes | Original research contribution, policy understanding | Grant writing, supervising, publishing | Advocacy, critical thinking |
| **Fellowships** | Subspecialty ICUs, labs | Domain-specific expertise (sleep, ECMO, pulmonary rehab) | Advanced procedures, interprofessional collaboration | Lifelong learning, mentorship |

### 7.4 Entry Requirements & Progression

- **BSc RT → MSc RT → PhD** pathway
- Direct entry into MSC RT requires **BSc RT or equivalent + licensure**
- PhD requires **MSc RT or relevant Master's degree + research proposal**
- Fellowships: **Post-MSc RT + clinical experience in relevant subspecialty**

### 7.5 Performance Indicators

Aligned with program outcomes:

- Clinical competence (patient outcomes, error-free procedures)
- Academic outputs (lectures, course evaluations)
- Research outputs (publications, funded projects)
- Administrative benchmarks (program audits, accreditation compliance)

### 7.6 Supervision & CPD Expectations

- Regular supervision ratios (e.g., 1 MSC RT faculty: 5 BSC RT students)
- Annual CPD: minimum CME/credits as per NCAHP guidelines
- Mandatory logbook updates and appraisal
- CPD credits tied to **relicensure and fellowship eligibility**

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# Chapter-8

# Scope of Job & Areas of Respiratory Technology Interventions

## 8.1 Overview

Respiratory Therapists (RTs) are highly trained professionals with expertise in pulmonary and critical care sciences. Their scope spans **acute care, diagnostics, rehabilitation, home care, industry, education, and research.**They work collaboratively with pulmonologists, intensivists, anesthesiologists, and other allied health professionals, forming an essential component of modern healthcare delivery.

## 8.2 Core Domains of Intervention

| Domain | Intervention Areas | Settings | Referral Pathways |
|---|---|---|---|
| **Critical Care (ICU/ED/OT)** | Airway management, oxygen therapy, invasive & non-invasive ventilation, bronchoscopy assistance, ECMO participation | ICUs, EDs, Operating Theatres | Multidisciplinary team (MDT)-based referral |
| **Pulmonary Diagnostics** | Spirometry, DLCO, body plethysmography, 6MWT, impulse oscillometry | PFT Labs, Research Labs | Independent testing followed by physician referral |
| **Sleep Medicine** | Polysomnography, CPAP/BiPAP titration, sleep data analysis, patient education | Sleep Labs, Home sleep testing | Independent testing followed by physician or RPSGT licensed clinician directed therapy |
| **Pediatric & Neonatal Care** | NICU ventilation, surfactant therapy, apnea monitoring, CPAP/HFNC | NICUs, Pediatric ICUs | MDT-basedreferral |
| **Pulmonary Rehabilitation** | Patient selection, Airway clearance, patient education, smoking cessation | Rehab centers, community hospitals, outpatient | As instructed by the referring physician or a doctoral level respiratory therapist |
| **Home & Community Care** | Home oxygen therapy, CPAP/BiPAP setup, patient & caregiver training, follow-up visits | Home health services, rural health outreach | As prescribed and instructed by the referring physician |
| **Emergency & Transport** | Pre-hospital airway management, ventilator support in road/air ambulance, safe patient transfer (including ECMO transport) | Emergency Dept, Ambulance, Inter-hospital transfer | MDT-based |

| Domain | Intervention Areas | Settings | Referral Pathways |
|---|---|---|---|
| **Industry & Technology** | Ventilator/respiratory device design, application specialist roles, quality testing | MedTech companies, biomedical engineering units | Independent employment |
| **Education & Research** | Academic teaching, curriculum development, clinical & translational research | Universities, research institutes | Independent + regulatory alignment |
| **Administration & Leadership** | Department head, program director, hospital management | Hospitals, universities, professional bodies | Appointed/Promoted roles |

### 8.3 Patient Journey Model (per domain)

All RT interventions follow a structured **care pathway**:
Assessment → Care Plan → Intervention → Monitoring → Outcome Metrics

**NIV Patient Journey Model**

**Assessment:** Evaluate respiratory distress, ABG/VBG, airway patency, NIV indications, and select interface.

**Care Plan:** Decide NIV initiation, choose mode/pressures, set safety measures, and prepare equipment.

**Intervention:** Start NIV, titrate pressures, optimize synchrony, ensure comfort, and provide patient coaching.

**Monitoring:** Track $SpO_2$, RR, leaks, synchrony, tolerance, skin integrity; repeat ABG/VBG as needed.

**Outcome:** Assess improvement in ventilation/oxygenation, work of breathing, and decide continuation, weaning, or escalation.

### 8.4 Safety, Ethics & Medico-Legal Framework

- **Safety**: Strict adherence to infection control, patient monitoring, equipment calibration.
- **Ethics**: Informed consent, confidentiality, respect for autonomy.
- **Medico-Legal**: Practice strictly within NCAHP-defined scope, maintain comprehensive documentation, uphold standards of care.

### 8.5 Graduate Capability Alignment

| Level | Expected Capability |
|---|---|
| **BSC RT Exit** | Safe supervised practice, routine RT interventions, emergency participation |
| **MSC RT Exit** | Independent advanced practice, protocol development, teaching/mentoring |
| **Fellowship Graduate** | Subspecialty expertise (Sleep, ECMO, Rehab), advanced leadership |
| **PhD Graduate** | Research, policy, innovation, academic leadership, international collaboration |

### 8.6 Expanded Areas of Practice (Global & National Context)

- **ICU & Critical Care**: Ventilation, oxygen therapy, bronchoscopy assistance.
- **Diagnostics**: PFT, Sleep medicine.
- **Rehabilitation & Community**: Pulmonary rehab, home ventilation.
- **Transport Medicine**: Intra/inter-hospital, air/road ambulance, ECMO transport.
- **Industry Roles**: Device design, application specialist roles.
- **Academia & Research**: Teaching, PhD-level research, publications.
- **Hospital Management**: Leadership in respiratory care services, protocol & policy framing.
- **Public Health**: Community awareness programs, smoking cessation, vaccination campaigns.

## Annexures & References — Implementation Steps

### Annexure 1: Official Logbook Proforma

This logbook is a mandatory record for all Respiratory Technology trainees. It serves as evidence of clinical exposure, skills performed, and professional development. Institutions may add their **logo, department name, or institutional ID** in the header.

**Logbook Format**

| Date | Patient Identifier (IP/OP No.) | Clinical Setting (ICU/OT/PFT/ Sleep Lab/ER) | Procedure/ Intervention Performed | Outcome/ Observation | Student Remarks | Supervisor Name & Signature |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Instructions for Use**

1. Each entry must include **patient identifiers** (IP/OP number only; no names to maintain confidentiality).
2. Record **all procedures and interventions** (e.g., intubation, ventilator setup, ABG sampling, nebulization, sleep study scoring, PFT testing).
3. Outcomes should note whether the intervention was successful, repeated, or required escalation.
4. Supervisors must **verify and sign daily/weekly entries**.
5. Completed logbooks are to be submitted at the end of each posting and evaluated as part of internal assessment.

## Annexure 2:

### Minimum Standards Audit

**Minimum Standard Requirements (MSR) – Respiratory Technology Programs**

**1. Bachelor of Science in Respiratory Technology (B.Sc. RT)**

**1.1 Eligibility**

- 10+2 (or equivalent) with Physics, Chemistry, and Biology.
- Minimum criteria: Pass in 10+2 (or equivalent).

**1.2 Duration**

- **3 years academic course + 1 year compulsory internship** (total 4 years).

**1.3 Intake Capacity**

- **20–25 students per batch** (depending on faculty strength, clinical facility, and university norms).

**1.4 Infrastructure & Facilities**

- **Lecture halls** with seating, audio-visual aids.
- **Laboratories**: Anatomy, Physiology, Biochemistry, Pathology, Microbiology, Simulation/Skills lab for RT procedures.
- **Library**: Adequate reference books, journals, e-access.
- **Clinical facilities**: Affiliated teaching hospital(s) with ICU, Pulmonology, Sleep Lab, PFT Lab, OT, and Emergency Dept.

**1.5 Faculty Requirement**

- **1 Professor / Associate Professor (Head of Department)**.
- **2–3 Assistant Professors**.
- **Lecturer 2**
- **3–4 Tutors / Clinical Instructors**.
- Faculty–student ratio: **1:10 (clinical)** and **1:15 (theory)**.

**1.6 Clinical Training**

- Minimum **12 months of compulsory rotatory internship** covering:
    - Medical, Surgical & Neuro ICU
    - Pediatric & Neonatal ICU
    - Pulmonary Function Testing & Sleep Lab
    - Operation Theatres & Emergency Department

**1.7 Attendance**

- Minimum **80% attendance** in theory, **90% in clinical/practicals**.

**1.8 Assessment**

- University examinations at the end of each academic year.
- Internal assessments with minimum **50% pass marks**.
- Final classification based on university norms (CGPA or percentage).

## 2. Master of Science in Respiratory Technology (M.Sc RT)

### 2.1 Eligibility

- B.ScRespiratory Technology (or equivalent) from recognized university.
- Minimum **55% aggregate marks**.
- Valid registration with State/National Council (where applicable).

### 2.2 Duration

- **2 years full-time program** (including dissertation/research project).

### 2.3 Intake Capacity

- **5 - 8 students per batch**.

### 2.4 Infrastructure & Facilities

- **Advanced simulation lab** for ventilator & airway management.
- **Access to multidisciplinary ICUs, Sleep Labs, ECMO centers**.
- **Computer lab with statistical software** for research training.
- **Library** with advanced journals, international Respiratory Technology& critical care texts.

### 2.5 Faculty Requirement

- **1 Professor (with PhD / >10 years experience)**.
- **1–2 Associate Professors**.
- **2 Assistant Professors**.
- **Guest faculty/visiting consultants** from Pulmonology, Critical Care, Anesthesiology.
- Faculty–student ratio: **1:5 (clinical/research supervision)**.

### 2.6 Clinical & Research Training

- Students posted in **ICUs, Pulmonology, Sleep Medicine, and Research labs**.
- **Mandatory teaching exposure** (UG classes/tutorials).
- **Dissertation**: Original research required.
- At least **1 paper submission / presentation** in national/international conference encouraged.

### 2.7 Attendance

- Minimum **80% theory, 90% clinical/research postings**.

### 2.8 Assessment

- **Semester/annual university exams** (theory + OSCE + viva).
- **Dissertation viva** mandatory for degree award.

## Annexure 3:

### Clinical Fellowships Guidelines

**Fellowships for Respiratory Therapists**

**Purpose**

Fellowships are short-duration, competency-based advanced training programs designed to enhance the clinical, academic, and research expertise of Respiratory Therapists (RTs) beyond the B.Sc. and M.Sc. levels. These programs focus on subspecialty skill development and prepare RTs for leadership roles in specialized domains of healthcare.

**General Guidelines for Fellowships**

- **Eligibility:**
  - B.Sc. Respiratory Technology with minimum 2 years clinical experience, OR
  - M.Sc. Respiratory Technology (fresh graduates eligible).
- **Duration:** 12–18 months (full-time, competency-based).
- **Mode of Training:** Clinical postings, didactic sessions, simulation training, journal clubs, and research projects.
- **Evaluation:** Logbook maintenance, OSCE/OSPE, clinical case discussions, viva, and dissertation/project work.
- **Intake Capacity:** 1–2 candidates per recognized faculty mentor per year.
- **Certification:** Awarded by Universities/recognized Institutions under the approval of NCAHP.

### List of Recommended Fellowships for Respiratory Therapists

**1. Fellowship in Critical Care Respiratory Technology**

- **Objectives:**
  - Advanced ventilator management in multi-organ failure.
  - Hemodynamic monitoring and interaction with mechanical ventilation.
  - ECMO, CRRT interface, prone positioning, and difficult weaning.
- **Competencies:** Advanced decision-making in ICU care, ventilator-induced injury mitigation, multidisciplinary critical care collaboration.

**2. Fellowship in Sleep Medicine & Polysomnography**

- **Objectives:**
  - Comprehensive training in sleep physiology, sleep disorders, and diagnostic techniques.
  - Hands-on training in polysomnography (PSG), CPAP/BiPAP titration, and home sleep testing.
- **Competencies:** Independent sleep study scoring, interpretation, titration protocols, and patient counseling.

**3. Fellowship in Neonatal & Pediatric Respiratory Care**

- **Objectives:**
  - Specialized training in neonatal and pediatric mechanical ventilation.
  - Apnea monitoring, surfactant therapy, and high-frequency ventilation.
- **Competencies:** Advanced NICU and PICU respiratory care, family-centered interventions, neonatal transport support.

**4. Fellowship in Pulmonary Diagnostics & Interventional Respiratory Care**

- **Objectives:**
  - Proficiency in PFTs, bronchoscopy assistance, and advanced respiratory diagnostics.
  - Support in pleural and mediastinal interventions (thoracoscopy, thoracentesis, chest tube management).
- **Competencies:** Independent PFT lab operation, bronchoscopy suite support, and peri-procedural care.

**5. Fellowship in ECMO & Advanced Life Support**

- **Objectives:**
  - Cannulation basics, circuit monitoring, anticoagulation, and troubleshooting in ECMO.
  - Integration of ECMO with ventilatory and hemodynamic support.
- **Competencies:** ECMO bedside specialist role, ECPR (Extracorporeal CPR), and transport on ECMO.

**6. Fellowship in Research & Academic Respiratory Technology**

- **Objectives:**
  - Methodology of clinical research, biostatistics, and systematic reviews/meta-analyses.
  - Pedagogical training for future educators.
- **Competencies:** Designing, executing, and publishing high-quality research; developing curriculum; leading academic initiatives.

**Minimum Standard Requirements (MSR) for Fellowships**

1. **Faculty:** Minimum 2 senior faculty with >5 years post-PG experience in specialty.
2. **Infrastructure:** Dedicated ICU/NICU/Sleep lab/ECMO unit depending on fellowship.
3. **Clinical Material:** Minimum case load defined (e.g., ≥300 ventilated patients/year for Critical Care fellowship).
4. **Teaching Program:** Weekly academic sessions (seminars, journal clubs, simulation).
5. **Assessment:** Continuous evaluation, logbook verification, exit exam (theory + OSCE + dissertation).
6. **Outcome:** Competency certificate with NCAHP endorsement.

## Annexure 4:

### Internal SOPs

**1. Inspections**

- **Self-Audit:**
  - Each institution offering the Respiratory Technology program shall conduct an **annual self-audit** to evaluate compliance with Minimum Standard Requirements (MSR) laid down by NCAHP.
  - The self-audit must cover faculty qualifications, infrastructure, student-to-faculty ratio, case load, clinical facilities, and academic activities.
- **NCAHP Inspection:**
  - Institutions are subject to periodic inspection by NCAHP-appointed assessors.
  - Surprise/short-notice inspections may also be undertaken to ensure adherence to standards.
  - Institutions must maintain **readiness files** (faculty CVs, logbooks, CPD registers, annual reports) for immediate verification.

**2. Fees**

- **Transparency:**
  - Fee structure must be publicly available on the institution's website and in admission prospectus.
  - A clear **breakdown of tuition, clinical training, examination, library, and laboratory charges** should be provided.
- **Refund Policy:**
  - Institutions must comply with NCAHP/UGC refund guidelines.
  - Refunds (if applicable) should be processed within **30 days** of withdrawal.
  - Any deductions (administrative charges, proportionate tuition fee) must be clearly specified in advance.

**3. Reporting**

- **Annual Report Submission to NCAHP:**
  Institutions must submit an **annual report** containing:
  - **Student Outcomes:** Enrollment, progression, graduation rates, placements, licensure exam pass rates.
  - **CPD Records:** Faculty and student participation in workshops, CMEs, conferences, and research.
  - **Faculty Profiles:** Updated CVs, qualifications, publications, CPD participation, and training contributions.
  - **Program Evaluation:** Feedback from students, alumni, and employers with corrective action taken.
- **Data Transparency:**
  - Reports should be uploaded to the institution's website for public access.
  - Key indicators must be available for benchmarking across institutions.