

## **PARAMEDICAL COURSES**

Paramedical Sciences is the intersection of Healthcare, Public Health, and Public Safety. We often assume that it is only the doctor who shoulders the entire responsibility of ensuring that we are back on our feet! We fail to realize that it is a team of professionals that work in sync so as to ensure that we turn hail and healthy. When we fall sick, seeing a doctor is only one part of the healing process. The rest of it, right from testing (to help identify the disease), to dispensing the medicines, to post - operative care is handled by Pharmacists, Nurses, Radiologists, etc. Each of these professionals pursue a rigorous course and undergo training to become a professional.

In this section, we would be looking at the courses falling under Paramedical Sciences, i.e. the courses that would enable an individual to become a Paramedical Professional.

The major areas of work in the field of Paramedical Sciences are spinal injury management, fracture management, obstetrics, management of burns and assessment, and evaluation of general incident scene. The increasing demand of skilled paramedical professionals has opened up several career opportunities for young aspirants. Many paramedical institutes offer courses at degree and diploma levels.

To become a successful paramedic, a person should have the ability to work in rotational shifts and should have presence of mind to take the right decision during an emergency. He / She should be physically fit and be able to make use of correct precautionary measures to treat the injured person. Paramedics are the key players in the Health and Medical Sector. Without paramedics, the entire Health Industry is out of gear and is almost non- functional.

The increase in number of patients, variety of diseases, and the demand for intensive treatment have paved the way for Paramedical Professionals who are expert technicians or therapists providing better quality towards human health care. Thus, the field of Paramedical Sciences is gaining an ever increasing importance and demand and is also leading to lucrative career opportunities in the health sector.

### **Eligibility:**

A candidate should have passed Class 12 with Physics, Chemistry, and Biology, with at least 50% of marks in each subject. The minimum age required is 17 years.

Let us now take a look at some of the most popular Paramedical Courses:

S. No.	Paramedical Course	Duration	Eligibility
1.	BPT - Bachelor of Occupational Therapy	3. 5 Years	10+2 with PCB
2.	BPT - Bachelor of Physio / Physical Therapy	3. 5-4 Years	10+2 with PCB
3.	Prosthetic and Orthotic Engineering	3 Years	10+2 with PCB
4.	B. Sc. (Audiology and Speech Therapy)	3 Years	10+2 with PCB
5.	B. Sc. (Ophthalmic Technology)	3 Years	10+2 with PCB
6.	Bachelor (Mental Rehabilitation) - BMR	3 Years	10+2 with PCB
7.	B. Sc. (Human Biology)	3 Years	10+2 with PCB
8.	B. Sc. (Radiography)	3 Years	10+2 with PCB
9.	B. Sc. (Radio Therapy)	3 Years	10+2 with PCB

<b>10.</b>	<b>B. Sc. (Nuclear Medicine)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>11.</b>	<b>B. Sc. (Respiratory Therapy Technology)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>12.</b>	<b>B. Sc. (Medical Technology X-Ray)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>13.</b>	<b>B. Sc. (Medical Secretarial Service)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>14.</b>	<b>B. Sc. (Operation Theatres)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>15.</b>	<b>B. Sc. (Medical Laboratory Technology)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>16.</b>	<b>B. Sc. (Allied Health Services)</b>	<b>4 Years</b>	<b>10+2 with PCB</b>
<b>17.</b>	<b>Bachelor of Speech, Language, &amp; Hearing (BSLH)</b>	<b>3 Years</b>	<b>10+2 with PCB</b>
<b>18.</b>	<b>Bachelor of Naturopathy &amp; Yogic Science</b>	<b>5 Years</b>	<b>10+2 with PCB</b>

**Some of the major streams in Paramedicine include:**

**Physiotherapy:**

It is a healthcare profession predominantly concerned with the remediation of impairments and disabilities and the promotion of mobility, functional ability, quality of life and movement potential through examination, evaluation, diagnosis and physical intervention.

A physiotherapist uses physical exercise therapy, other therapeutic agents like heat, radiation, water, electricity, etc. along with massage to cure weaknesses and rebuild the damaged muscles, joints and bones.

**Course:** The course that one would have to pursue to is the Bachelors course in Physiotherapy (BPT), which is a 4-year programme with 6 months of internship.

**Qualification required for Admission:** A candidate should have passed Class 12 in Science with Biology as a subject with at least 50% of marks in each subject. The minimum age required is 17 years. There could be additional eligibility depending on the college/university norms.

**Job Prospects:** Physiotherapists can find employment opportunities at hospitals majorly in ICU or Geriatrics. There is also scope for private practice. Physiotherapists can work in hospitals, orthopedic departments, schools for mentally retarded and physically disabled children, health institutions, and defense medical establishments. The job roles would include a senior position like senior physiotherapist, supervisor of physical therapy, superintendent of physiotherapy in government hospital and as demonstrators, lecturers, assistant professors, and associate professors in medical colleges.

**Some of the top colleges for this course include:**

- Pt. Deendayal Upadhyaya Institute for the Physically Handicapped, New Delhi
- School of Physiotherapy, SSG Hospital, Baroda, Gujarat
- Nizam's Institute of Medical Sciences, Hyderabad, Telangana
- Indian Institute of Health Education & Research, Patna, Bihar
- Government Medical College (GMC), Nagpur, Maharashtra.

**Occupational Therapy:**

Occupational Therapy (OT) focuses on helping people achieve independence in all areas of their lives. OT can help children with various needs improve their cognitive, physical, and motor skills and enhance their self-esteem and sense of accomplishment.

An occupational therapist rehabilitates physically handicapped and mentally retarded persons. It is a kind of treatment imparted through indulging in different activities like handicrafts, manual and industrial art, recreation, and activities of daily living.

**Course:** B. Sc. Occupational Therapy is a 4 - year programme.

**Qualification required for Admission:** A candidate should have passed Class 12 in Science with Biology (Physics, Chemistry and Biology).

**Job Prospects:** They can find employment in hospitals, rehabilitation centers, and diagnostic centers apart from offering freelance services. Occupational therapists work with the patients on various disorders such as orthopedic and neurological conditions, among other conditions. In schools, they evaluate children's ability and provide therapy. They also supervise adult day care, residential care and mental health care programs.

**Some of the top colleges for this course include:**

- Manipal College of Allied Health Sciences, Manipal University, Manipal
- Lokmanya Tilak Municipal Medical College, Mumbai
- Christian Medical College, Vellore (Tamil Nadu)
- Pt. Deen Dayal Institute for Physically Handicapped, New Delhi
- All India Institute of Physical Medicine and Handicapped, Mumbai

## **Speech Therapy**

Speech therapy is concerned with the management of disorders of speech, communication, language, and swallowing in children and adults.

Remember the Oscar winning movie, The King's Speech? In the movie, the Australian speech therapist Lionel Logue, has his royal client, King George VI who has severe stuttering, sing, swear, and perform various strange vocal exercises.

A Speech Therapist is concerned with the treatment of loss of hearing and problems of speaking. He/she imparts treatment speech impairments like stammering and other communication disabilities through Psychological help and supportive speech therapy.

**Course:** B. Sc. Audiology and Speech Therapy for a duration of 3 years.

**Qualification required for Admission:** Pass in Pre-University with 50% marks, or equivalent with Physics, Chemistry and Biology or Graduation with Psychology or Education is desirable. Age requirement is 17-25 years.

**Job Prospects:** They can find employment in hospitals, rehabilitation centers, schools, medical departments of the state and central governments etc. They can also offer freelance services. Speech Therapists and Audiologists can work in

hospitals, schools, community health and welfare centers, private practice and even in industry (to monitor the effect of noise pollution). Postgraduate qualifications can go for a teaching job or research positions.

**Some of the top colleges for this course include:**

- All-India Institute of Medical Sciences, New Delhi
- All India Institute of Speech and Hearing (AIISH), Mysuru
- Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh
- Manipal College of Allied Health Sciences (MCOAHS) Karnataka
- Indian Institute of Health Education and Research, Patna, Bihar

**Prosthetic and Orthotic Engineering**

Prosthetics and Orthotics is a medical and engineering based healthcare profession which deals with rehabilitation of physically handicapped individuals who suffer from limb malfunctions or abnormalities, or absence or loss of limbs, or other body parts. The loss of body parts may have been the result of an accident, or mishap, or amputation owing to medical conditions like diabetes or gangrene, or cancer, or in some cases the defect may be congenital i.e. people are born with this handicap where a limb or a body part may be missing. Such a condition prevents a person from leading a normal life. There may also be cases where people suffering from conditions like polio or muscular degeneration need an external support for movement and strength to go about their day to day activities.

It involves manufacture of artificial structures which may replace the inoperative parts or missing parts of the body. The field of prosthetics and orthotics involves designing and fitting artificial limbs or braces. It is a component of the health care field, and individuals work either as an orthotist or a prosthetist.

**Course:** Diploma in Prosthetic or Orthotic Engineering (DPOE). The course is for a duration of 4.5 years.

**Qualification required for Diploma in Prosthetic or Orthotic Engineering:** Candidate must have passed (10 + 2) with Physics, Chemistry and Mathematics and Biology.

**Job Prospects:** They can find employment in hospitals, rehabilitation centers, diagnostic centers, polyclinics etc. They work in hospitals, clinics, laboratories, work room and fitting rooms, device manufacturing companies, rehabilitation departments of hospitals and government agencies, ambulatory care services and special treatment facilities like arthritis centers. Teaching and research and development are other options available to them.

This profession is a time demanding one but brings with it good employment opportunities and self-practice facilities. Based on such educational qualifications and professional experience, P&O professionals may get posted as Technologists, Consultants, Prosthetists and Orthotists in the supervisory level, as Technicians or Assistants. With upgrading of skills and considerable amount of job experience they may become Head of the Department. Those in the teaching field can become Instructors and Lecturers. Yet others can join R&D cells of government organizations and MNCs as Researchers. Trained professionals can also start their own manufacturing and maintenance units.

**Some of the top colleges for this course include:**

- All India Institute of Physical Medicine and Rehabilitation, Mumbai
- National Institute of Locomotor Disabilities, Kolkata
- Christian Medical College, Vellore, Tamil Nadu
- Pt. Deendayal Upadhyaya Institute of Physically Handicapped, New Delhi
- National Institute of Rehabilitation Training and Research, Odisha

**Nursing:**

Nursing encompasses autonomous and collaborative care of individuals of all ages, families, groups and communities. It includes the promotion of health, prevention of illness, and the care of ill, disabled and the dying people. In fact, Florence Nightingale won over people's hearts by her unconditional love and care to people as a nurse and was also the founder of modern nursing!

A nurse assists doctors and renders services to the patients in getting the temperature and pulse recorded, administering medication both orally and through injections, changing dressings, giving personal care, preparing patients for surgery etc.

Nursing courses in India can be categorized into bachelor's degree courses (B. Sc. Nursing) and master's degree courses (M. Sc. Nursing). In addition, diploma courses in nursing are also offered by a number of healthcare education institutes in India like General Nursing and Midwifery (GNM) diploma courses.

**Courses available to become a Nurse:**

- B.Sc. Nursing: A 4-year program
- General Nursing and Midwifery (GNM): A 3.5 years program
- Auxiliary Nurse Midwife (ANM) – 1.5 years program
- Health worker (female) - 18 months program

**Qualification required for Admission:**

- For B. Sc. Nursing: A candidate should have passed (10+2) with 45%

aggregate in Physics, Chemistry, Biology and English.

- General Nursing and Midwifery (GNM): A candidate should have passed (10+2) with 40% aggregate in Biology, Physics and Chemistry.

In order to pursue higher studies or M. Sc. in Nursing, candidates should have a B. Sc. in Nursing with the requisite marks. While studying M. Sc. in Nursing, they can specialize in the following areas:

- Oncological Nursing
- Cardiological/CTVS Nursing e Nephrological Nursing
- Neurosciences Nursing
- Pediatric Nursing
- Critical Care Nursing
- Psychiatric Nursing

**Job Prospects:** Opportunities are flooded for these professional as they can get employment everywhere whether it is hospitals, nursing homes, sanatoria, schools, industry or in private medical clinics. There are opportunities with Defence Forces, where nursing graduates can aspire to become commissioned officers.

**After qualifying with a B. Sc. or M. Sc. in Nursing, candidates can work in the following domains:**

- Staff Nurse - Offers direct patient care to one person or a team of individuals.
- Assistant Nursing Superintendent/Department Supervisor.
- Deputy Nursing Superintendent
- Nursing Supervisor or Ward Sister
- Director of Nursing
- Nursing Superintendent
- Teacher of Nursing
- Community Health Nurse (CHN) e Military Nurse
- Industrial Nurse
- Nursing Service Administrators. e Nursing Service overseas

**Some of the top colleges for this course include:**

- Calcutta Institute of Nursing and Paramedical Science



- BV DU College of Nursing, Navi Mumbai
- Bharati Vidyapeeth College of Nursing
- Rabindranath Tagore University, Bhopal
- Indian Academy College of Nursing, Bangalore

## **Pharmacy**

Pharmacy is a health profession that links health sciences with chemical sciences and aims to ensure the safe and effective use of pharmaceutical drugs.

The scope of pharmacy practice includes more traditional roles such as compounding and dispensing medications, and it also includes more modern services related to health care, including clinical services, reviewing medications for safety and efficacy, and providing drug information.

Pharmacists, therefore, are the experts on drug therapy and are the primary health professionals who optimize use of medication for the benefit of the patients.

An establishment in which pharmacy (in the first sense) is practiced is called a pharmacy (this term is more common in the United States) or a chemist's (which is more common in Great Britain). In the United States and Canada, drugstores commonly sell drugs, as well as miscellaneous items such as confectionary, cosmetics, office supplies, and magazines and occasionally refreshments, and groceries.

Pharmacists undergo university-level education to understand the biochemical mechanisms and actions of drugs, drug uses, therapeutic roles, side effects, potential drug interactions, and monitoring parameters. This is mated to anatomy, physiology, and pathophysiology. Pharmacists interpret and communicate this specialized knowledge to patients, physicians, and other health care providers.

Among other licensing requirements, different countries require pharmacists to hold a Bachelor of Pharmacy, Master of Pharmacy, or Doctor of Pharmacy degree.

They are concerned with production of pharmaceutical products, development of the methods of production and quality control. They also deliver medicines as per the prescription given by a doctor and give instructions regarding the mode of consumption of medicine.

### **Courses available to become a Pharmacist:**

- Diploma in Pharmacy (D. Pharm): 2 years
- Bachelor of Pharmacy (B. Pharm): 4 years

- Master of Pharmacy (M. Pharm): 1.5 years or 2 years
- Research Studies (Ph. D): 2 to 3 years
- Pharm D: 6 years

**Qualification required for Admission:** Candidate should have passed (10+2) in science stream with Physics, Chemistry and Biology for D. Pharm and B. Pharm.

At Bachelor level there is no specialization. At the masters level (M. Pharm) specialization is available in Pharmaceutics, Pharmacognosy, Pharmaceutical Chemistry, Biochemistry, Pharmaceutical Engineering etc. After M. Pharm, candidates can go for Ph. D programme in Pharmaceutics, Pharmaceutical Chemistry, Pharmacology, Pharmaceutical Marketing and Management.

In the present world, there are number of pharmaceuticals companies, hospitals and nursing homes all over the globe exhibiting a rapid growth of the pharmacy sector. Pharmacy offers sensible job opportunities to its graduates in terms of business or by opening their own business. Candidates can open their own druggist shop or a pharmacy medical shop after completion of their Degree or Diploma program in pharmacy and after registering with a pharmacy council.

A number of MNC's such as Smith Kline Beecham, E Merck and Hoechst work together with top Indian companies to develop numerous new drugs for the welfare of people.

**Some Job Types are:**

- Lecturer e-Data Manager e-Customs Officer
- Drug Inspector
- Analytical Chemist
- Regulatory Manager
- Researcher
- Medical Transcriptionist

**Some of the top colleges for this course include:**

- National Institute of Pharmaceutical Education and Research, Mohali
- Jamia Hamdard, New Delhi
- Annamalai University, Chennai
- Department of Pharmaceutics, IIT BHU, Varanasi
- National institute of Pharmaceutical Education and Research, Hyderabad

## **Pharma. D.**

Pharm. D. is a Latin term which means Pharmaciae Doctor. It is a registered qualification under Pharmacy Act, 1948. The course was introduced by Pharmacy Council of India (PCI), the regulatory body for pharmacy education in India, in the year 2008. The course is meant for students who have an interest in learning of concepts related to clinical research and acquire an in- depth understanding of pharmacy practice concepts.

This course was developed with an objective of developing pharmacists to play an important role in patient care as members of the health care team. Pharma. D. is a 6 years program during which 5 years is academic session and sixth year is completely bound to internship in hospital.

Pharm. D (Post Baccalaureate), on the other hand, is a three years program including two years study and one year internship in the hospital.

At the end of the course, the clinical pharmacists develop and acquire competencies (knowledge, skill and attitude) to provide pharmaceutical care services, drug and poison information services, patient counseling, identify drug-drug interactions, monitor adverse drug reactions, carry out therapeutic drug monitoring, help in drug dosage adjustment in special population and renal/hepatic patients, assist/co-ordinate in the conduct of clinical trials, promote rational use of medicines and ultimately contribute to better patient care.

**Eligibility:** A pass in Class 12 examination with Physics and Chemistry as compulsory subjects along with Mathematics or Biology.

**OR**

A pass in D. Pharm course from an institution approved by the Pharmacy council of India under section 12 of The Pharmacy Act.

**Job Prospects:** A number of opportunities would be available to these graduates which include Medical Writing, Hospitals and Healthcare Centers, Clinical Trials, Community Pharmacy and Consultant Pharmacists, Academic Pharmacy, Pharmacovigilance and Drug Safety etc.

**Some of the top colleges for this course in India include:**

- SRM University, Kanchipuram
- Acharya Institute of Technology, Bangalore
- Jaipur National University, Jaipur

- Andhra University, Vishakhapatnam
- Jawaharlal Nehru Technological University, Anantapur

## **Radiology**

Radiology is a paramedical professional course, offered to individuals who perform diagnostic tests in medical treatment with the use of radiation. While the branch of medicine is called radiology, the actual technology used is called radiography.

In simple terms, radiography may be described as the science of taking images of the internal and hidden portions of the human body for the purpose of diagnosing diseases and ailments. This includes the use of ultrasound, X-ray, CT scan, MRI, etc.

This profession, calls for considerable technological expertise. Radiographers work as a part of the healthcare team in the Diagnostic Imaging Department, Accident & Emergency, Intensive Care Unit and Operating Theatre.

Alternatively, radiotherapy is a treatment to destroy cancer cells with radiation. A beam of radiation is targeted on the cancer, which shrinks it. A career in radiography can be very promising. The demand for radiographers has increased considerably in recent times, with significant technological development in medical sciences creating new job opportunities.

**Qualification required:** A candidate should have attained a minimum of 45 % marks in (10 + 2) in Physics, Chemistry, Biology /Mathematics and English.

**Career Prospects:** The career options are many and also quite highly paid as it is one of the most promising career options in the paramedical field.

Employment prospects for radiographers are good, both within the country and overseas. With health services increasing leaps and bounds, radiographers are constantly in demand in nursing homes, hospitals, diagnostic centers as well as super-specialty hospitals.

In India, radiographers can work both in private and government hospitals. Jobs are available on part time and full-time work.

### **Some of the top colleges for this course in India include:**

- All India Institute of Medical Sciences, New Delhi
- Rajeev Gandhi University of Health Sciences, Bangalore
- University College of Medical Sciences and GTB Hospital, Shahdara
- Tata Memorial Center, Mumbai

➤ TCR Institute for Materials Technology, Mumbai

Apart from the aforementioned courses, there is a myriad of courses falling under the Paramedical stream. However, it is also important to take note of the opportunities available to students who study Biology. This is key because these students work closely with medical and paramedical professionals.

While a majority of these options would require for the students to pursue higher studies in the field, graduates in Biology would also find scope in them.

**These career paths include:**

1. **Biotechnologist:** New products which are designed to improve health, food, and the world around us are predominantly innovated by Biotechnologists, who use biological organisms in their work. They examine the genetic, chemical and physical attributes of cells, tissues and organisms which help them in developing these products. There are different types of biotechnologists including environmental, medical, industrial, agricultural, marine, and aquatic biotechnologists.

**Microbiologist:** Microbiologists play a key role in creating a difference in the lives of the people by working to ensure that the food we consume is safe. They aim to solve a range of problems affecting our health, the environment, climate and food and agriculture. Within microbiology, there are a variety of specialization options including medicine, healthcare, research, agriculture, food safety, environment, and climate change.

2. **Nutritionist:** Nutritionists are increasingly gaining recognition for being an integral part of both public and individual health. They are essentially involved with helping people in making the right food and eating choices! A degree in nutrition helps the student understand and develop the knowledge of nutrients and their effects, apart from the social factors that influence the same. This degree could be essential in job roles such as chef, dietician, personal trainer, product development scientist, etc.
3. **Research in Life Sciences:** A researcher in Life Sciences is essentially involved in planning and conducting experiments and analyzing their results with the aim to develop new products or processes which help in broadening the scientific understanding. The different specialization within this pathway include bioinformatics, cancer studies, genomics, stem cell research, plant sciences, etc.
4. **Science Writer:** This is an ideal career path for those students who have a flair for writing with a deep interest in the Sciences. Science writers create content for business, trade, and professional publications, specialist scientific and technical journals, and the general media. They are also involved in researching and editing scientific news, articles, and features. While science writers essentially work out of a fixed office environment, they may sometimes have to meet with clients or interview experts in other locations.

Additionally, there are several other career prospects for Biology students including Teaching, Biochemist, Genetic Counseling, Health Educator etc.

### **KEY TAKEAWAY**

- Paramedical science is the intersection of healthcare, public health and public safety. It can be called a science which is one step below the actual science of medicine.
- The major areas of work in the field of paramedical sciences are spinal injury management, fracture management, obstetrics, management of burns and assessment, and evaluation of general incident scene. Paramedics are trained to handle emergencies and assist the doctors and surgeons in performing complex procedures and operations
- A majority of colleges offer Bachelor of Science courses in various areas of paramedical sciences. In order to be eligible, a candidate should have passed (10+2) in Science with Bi- ology as a subject with at least 50% of marks in each subject. The minimum age required is 17 years
- Some of the famous areas in paramedical sciences are:
  - **Physiotherapy:** A study which is concerned about helping people with disabilities or mobility problems get back their functional ability.
  - **Occupational Therapy:** Which treats people with mental or physical disorders and helps them improve their motor skills.
  - **Speech Therapy:** Which helps people who have a speaking disability and trains them in speaking properly.
  - **Prosthetic and Orthotic Engineering:** The science which deals with the creation of artificial body parts for people who have lost their limbs.
  - **Nursing:** The study which trains people in taking care of people who require medical attention and helping them recover.
  - **Pharmacy:** The science and technique of preparing and dispensing drugs.
  - **Radiology:** The science of taking images of the internal and hidden portions of the human body for the purpose of diagnosing diseases and ailments, including the use of ultrasound, X-ray, CT scan, MRI, etc.
- The different career opportunities for Biology graduates include Biotechnologist, Microbiologist, Nutritionist, Researcher, Science Writer, Teaching, Biochemist, Genetic Counseling, Health Educator, etc.