

## **(161-SCI-16-03) M.SC. - MEDICAL PHYSICS**

### **Significance of the Program**

An MSc in Medical Physics holds significant importance as it equips individuals with the knowledge and skills to apply the principles of physics in areas like diagnostic imaging, radiation therapy, and nuclear medicine, contributing to advancements in medical technology and patient care.

### **Career Options**

A postgraduate in Medical Physics can:

- Work as a Clinical Medical Physicist in hospitals or medical centres, ensuring the safe and effective use of radiation in medical procedures.
- Oversee and implement radiation safety programs to protect patients, staff, and the public from unnecessary radiation exposure as a Radiation Protection Officer.
- Work as a Dosimetrist or Radiation therapist in collaboration with radiation oncologists to plan and calculate radiation doses for cancer treatment.
- Can engage in research as Research Scientist in medical physics, contributing to advancements in technology and treatment methodologies.
- Work as Medical Imaging Physicist in the maintenance of medical imaging equipment, such as X-ray, MRI, and CT scanners.
- Be a consultant providing expertise to healthcare facilities, regulatory bodies, or industry on matters related to medical physics and radiation safety.
- Pursue a career as an Academician and teach at universities sharing knowledge with the next generation of medical physicists.
- work as a Quality Assurance Expert ensuring the compliance of medical equipment to maintain high-quality healthcare services.

### **Objectives of the course:**

- To impart the quality of Medical Physics program focuses on the clinical application of radiation sciences in medicine. Students are trained to play a central role in developing, planning and implementing patient treatment programs.
- To Apply medical physics theories, methods and tools related to measurement of radiation dose (relative and absolute), verification of output from radiation producing machines, patient-specific treatment plans development, approval, and verification.

- To provide hands-on clinical education and to prepare the graduate for a professional career in radiation therapy.
- To develop treatment plans that provide adequate target coverage while sparing normal and critical tissues.
- To demonstrate an awareness of the complexity of knowledge in medical physics as well as receptiveness to alternative interpretations, new knowledge, and alternative approaches to problem solving.

#### **Outcomes of the Program:**

- On successful completion of the M. Sc. Medical Physics program, the students are expected to:
- Have basic knowledge in Atomic Physics, Nuclear Physics, Solid State Physics, Ionizing and Non-Ionizing Radiation Physics.
- Understand the Applied Mathematics in Radiation Sciences.
- Have domain knowledge in electronic components, computing skills using MATLAB, MATHEMATICA, and STATISTICA and analyze the results obtained in radioactive counting, medical imaging or therapy.
- Gain skills on clinical aspects of radiation oncology with necessary knowledge in anatomy, pathology, site specific signs, symptoms, diagnosis and management.
- Possess knowledge on Radiation Physics, Diagnostic radiology, External beam Radiotherapy, Brachytherapy, Radiation Detection, Radiation Dosimetry, Advanced Radiotherapy Techniques, Radiation Biology, and Radiation Safety as per National as well as International regulatory agencies.
- Exhibit skills in handling GM counter-based instruments, Gamma ray spectrometer, analyze the sources, and determine linear and mass attenuation of sources, optically stimulated luminescence dosimetry.
- Have hands-on experience with Treatment Planning System, LINAC, and QA tools.
- Understand the issues of managing radiation safety programme as stipulated by regulatory bodies to become a Radiological Safety Officer (RSO).
- Distinguish imaging techniques based on the demonstration of live blood perfusion imaging in nuclear medicine through PET-CT, SPECT and Gamma Camera.
- Have hands-on experience to handle Radiation Physics, Radiology, Radiotherapy,

- Nuclear Medicine procedures and experiments. Ability to do research in Medical Physics and allied areas.

**Major Course Outline**

1. The modules in an MSc in Medical Physics program typically include:
2. Radiation Physics
3. Radiobiology
4. Medical Imaging
5. Radiation Therapy Physics Dosimetry, and Clinical Applications