Name of the Course	Joint M.Sc.-PhD in Nuclear Medicine
Introduction	Nuclear Medicine is the branch of medical science which utilizes the radioisotopes for diagnosis and treatment of various disorders. In diagnosis nuclear imaging is unique because it provides precise functional information which is not obtained from other conventional imaging modalities. Gamma cameras, SPECT-CT, PET-CT, PET-MRI are advanced Nuclear Imaging equipment. This is also the principal Molecular imaging approach to depict glycolytic activity, amino-acid turnover, protein synthesis, receptor distribution and many other molecular and biochemical phenomenon. Nuclear imaging is also one of the principal imaging modalities in cancer and also for many benign non-cancerous diseases. Radio-isotope therapy is indicated for thyroid cancers, neuro-endocrine cancers, hepato-cellular cancers, painful bone metastases etc. *In vitro* and *in vivo* radiotracer techniques are major tools in advanced medical research. Modern medicine and oncology cannot be practiced without Nuclear Medicine. There is significant dearth of Nuclear Medicine Technologists in India. Many Nuclear Medicine units - diagnostic and therapeutic are being established all over the country but there is a lack of trained manpower. Such manpower also play important role in clinical research, drug development laboratories, cyclotron units, imaging equipment and pharmaceutical industries apart from their most important role in diagnostic and therapeutic nuclear medicine departments of the hospitals. The peer learning is a big part of this course and value for individuals and employers. The skill developments are directly linked to clinical practice and through research and publication. This course is designed in conjunction with a number of clinical experts, and partnership with clinical software provider in producing competent and professional practitioners with the skills needed to optimize and promote such imaging in current models of patient care as well as therapy and research.
Aim of the Course	To offerM.Sc. in Nuclear Medicine (with accreditationof Atomic Energy Regulatory Board (AERB), Government of India) jointly by Indian Institute of Technology Kharagpur (IITKGP) and Tata Medical Center (TMC), Kolkata.
Objectives	• Unique educational (fundamental & applied) and research foundations to the Nuclear Medicine (NM) work force. • The NM man-power will be skilled to serve current working practice in nuclear medicine in hospital set up. • The NM man-power will be efficient to understand research and advancement opportunities available in nuclear medicine and molecular image environments. • A means to achieve an affiliation with AERB as a radiation safety officer (RSO). • A means for Nuclear Medicine practicing outside of the above scopes to specialize in areas of relevant industry, medical academics and research.
Duration of program	• M.Sc.: 2 years • PhD: as per rule of IIT KGP (minimum 3 years; max: 8 years)
Skill set to be developed	• Safe use with quality assurance in practices of nuclear medicine technologies for diagnosis and therapy.
Additional comments	• Semester Examswill be conducted by the host Institute of the semester and the question papers will be set jointly as per necessity. Evaluation of the answer scripts will be done jointly. Responsibility for uploading grades in ERP will be done solely by Course/ Subject Coordinator from IIT Kharagpur. Comprehensive viva and project evaluation will be conducted jointly at the respective Institute. • **After 1st Semester One Month Non-credit Compulsory Training /Visit at TMC Nuclear Medicine Establishment:** To be familiar with work environment Nuclear Medicine Labs, Instruments, Experts and service to the patients. A daily diary to be maintained and at the end of the visit a report is to be submitted.

M.Sc. Nuclear Medicine Curriculum

Semester 1 **Location:** **IIT Kharagpur**	**Minimum Semester Credit Required: 24**	**Cumulative Semester Credit: 24**		
Subject Type	Subject No.	Subject Name	L_T_P	Credit
Depth	MM 61501	Basic Human Anatomy-Physiology-Pathology	3-1-0	4
Depth	MM (New)	Basics of Radiobiology – Radiopharmaceutical Chemistry and *In vitro* Diagnostic Techniques	3-0-0	3
Depth	MM61505	Physics & Instrumentation of Medical Imaging	3-1-0	4
Depth	MM (New)	Statistics and Computer science in Nuclear Medicine	3-1-0	4
Depth	PH60305	Principles of Radiation Detection and Measurements	3-0-0	3
Depth (Lab.)	MM69501	Basic human anatomy, physiology and pathology laboratory	0-0-3	2
Elective I	MM61207	Fundamentals of Biomaterials and Living Matter	3-1-0	4
	MM61215	Animal Transgenic Technologies	3-1-0	4
	MM72335	Cancer Biology	3-1-0	4
	MM61313	Medical Biotechnology	3-1-0	4
	MA60061	Statistical Technique & Computer Programming	3-1-0	4

After 1st Semester One Month Non-credit Compulsory Training /Visit at TMC Nuclear Medicine Establishment: To be familiar with work environment, Nuclear Medicine Labs, Instruments, Experts and service to the patients. A daily diary to be maintained and at the end of the visit a report is to be submitted.

Semester 2 **Location:** **IIT Kharagpur**	**Minimum Semester Credit Required: 27**	**Cumulative Semester Credit: 51**		
Subject Type	Subject No.	Subject Name	L_T_P	Credit
Depth	MM61312	Medical Imaging	3-1-0	4
Depth	MM 61318	Medical Electronics	3-0-0	3
Depth	MM (New)	Fundamentals of Biochemistry and cell biology	3-0-0	3
Depth	MM 71514	Molecular Imaging	3-1-0	4
Depth	MM60024	Bio-medical Imaging Informatics	3-0-0	3
Depth(Lab.)	MM69320	Medical electronics laboratory	0-0-3	2
Depth (Lab.)	PH (New)	Radiation Detection and Measurement laboratory	0-0-3	2
Elective II	MM61216	Advanced Immunology &Immunotherapeutics	3-1-0	4
	MM60002	Medical Technology, Society and Ethics	3-1-0	4
	MS60052	Introduction to Nanotechnology & Nanostructured Materials	3-1-0	4
	MM61214	Stem Cell Biology & Therapy	4-0-0	4
Depth	MM (New)	Viva	0-0-0	2

Semester 3 **Location: TMC Kolkata**	**Minimum Semester Credit Required:27**	**Cumulative Semester Credit:78**		
Subject Type	Subject No.	Subject Name	L_T_P	Credit
Depth	MM (New)	Radiopharmaceuticals	3-0-0	3
Depth	MM (New)	Nuclear imaging equipment and quality control	2-0-0	2
Depth	MM New)	Clinical nuclear imaging-I	3-0-0	3
Depth	MM (New)	Radiobiology	3-0-0	3
Depth	MM (New)	Radiation protection, regulatory aspects and operation	2-0-0	2
Depth (Lab)	MM (New)	Radiopharmacy laboratory	0-0-6	4
Depth (Lab)	MM (New)	Nuclear imaging & therapy lab.	0-0-6	4
Depth	MM (New)	Project	0-0-9	6

Semester 4 **Location: TMC Kolkata**	**Minimum Semester Credit Required:27**	**Cumulative Semester Credit:105**		
Subject Type	Subject No.	Subject Name	L_T_P	Credit
Depth	MM (New)	Clinical nuclear imaging-II	3-0-0	3
Depth (Lab.)	MM (New)	Clinical nuclear medicine diagnostic techniques laboratory	0-0-6	4
Depth (Lab.)	MM (New)	Clinical nuclear medicine therapy techniques laboratory	0-0-6	4
Depth	MM (New)	Viva	0-0-0	2
Depth	MM (New)	Seminar	0-0-3	2
Depth	MM (New)	Project	0-0-18	12