MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI
(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)
(Deemed to be University u/s 3 of UGC Act 1956)
Grade "A^{++}" Accredited by NAAC
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Curriculum for

Ph.D. Medical Radiology & Imaging Technology

Academic Year 2025 - 26

Syllabus of Ph.D entrance Medical Radiology & Imaging Technology

Unit I: Basics of Medical Imaging

1. Introduction to Medical Imaging
2. Historical perspective of Medical Imaging
3. Principles of Medical Imaging
4. Types of Medical Imaging Techniques
    - X ray Radiography
    - Computed Tomography (CT)
    - Magnetic Resonance Imaging (MRI)
    - Ultrasound Imaging
    - Nuclear Medicine Imaging (PET, SPECT)
    - Fluoroscopy
5. Contrast Agents in Medical Imaging
6. Image Quality in Medical Imaging

Unit II: Application of Radiology in Research

1. Role of Radiology in Research
2. Imaging Biomarkers in Disease Diagnosis and Treatment Monitoring
3. Imaging in Clinical Trials
4. Advanced Imaging Techniques for Research Purposes

Unit III: Basics of Imaging Modalities

1. Principles of CT Imaging
2. Principles of MRI Imaging
3. Principles of Ultrasound Imaging
4. Other Emerging Modalities in Medical Imaging
    - Optical Coherence Tomography (OCT)
    - Photoacoustic Imaging
    - Multimodal Imaging Techniques

Unit IV: Basics of Radiation Physics

1. Introduction to Radiation Physics
2. Properties of radiation
3. Interaction of Radiation with Matter
4. Radiation Detection and Measurement
5. Radiation Dose Units and Dosimetry
6. Radiation Safety Measures

Unit V: Basics of Image processing

1. Digital Image Fundamentals
2. Image Enhancement Techniques
3. Image Restoration Technique
4. Image Segmentation and Feature Extraction
5. Image Registration and Fusion
6. Image Analysis and Pattern Recognition

Unit VI: Basics of Radiation Protection

1. Principles of Radiation Protection
2. Radiation Exposure Limits and Regulations
3. Radiation Shielding Materials and Techniques
4. Radiation Monitoring and Personnel Dosimetry
5. Radiation Safety Practices in Medical Imaging facility
6. Radiation Protection in Interventional Procedures

Director