



MEDICAL DOSIMETRY CURRICULUM ANALYSIS

I. General Information	
Program Name	
JRCERT Program Number	
Date	

DIRECTIONS: Determine the course(s) in which each of the following content areas is covered and enter the course number(s) and/or title(s). For guidance in what should be covered for each content area, please refer to the Medical Dosimetry Curriculum Guide (2024) published by the American Association of Medical Dosimetrists.

This curriculum is designed for students who have no practical background or experience in the field of radiation oncology. The suggested curriculum contains introductory courses to the various technical and medical areas of radiation oncology, and program directors may choose to eliminate these courses for students who have had education or experience in these topics. However, program directors are encouraged to replace these introductory courses with refresher courses.

II. Clinical Competencies	
Professional Curriculum	Program Course(s)
Minimum Required Competencies	
Head and Neck	
Thoracic	

Abdomen	
Pelvis	
Extremities	
Brachytherapy	
Other	
Additional Recommended Activities	
Total Body Irradiation (TBI)	
Proton Treatment Planning	
Stereotactic Radiosurgery	
Total Skin Electron Irradiation (TSEI)	
Prone Breast	

III. Healthcare Ethics and Professional Conduct	
Professional Curriculum	Program Course(s)
What is Ethics?	
Professional and Legal Perspectives	
Continuum of Care	
Relationships and Insurance	

Reducing Liability/Defensive Medical Dosimetry and Physics	
Professional Conduct	
Professional Development	
Accreditation of Facilities	
Educational Accreditation	

IV. Patient Care	
Professional Curriculum	Program Course(s)
Communication	
Health Safety	
Patient Safety	
Patient Transfer	
Patient Education - Limited role of Medical Dosimetrist	

V. Radiation Protection and Safety	
Professional Curriculum	Program Course(s)
Definitions, Units and Risks	
Standards for Protection Against Radiation (10CFR20)	

Storage and Transportation	
Dose Limits	
Structural Shielding Design	
Personnel Monitoring	
Regulations	
Radiation Monitoring Instruments	
Radiation Surveys	
Radiation Safety and Quality Assurance Committees	

VI. Pathophysiology and Oncology Management	
Professional Curriculum	Program Course(s)
Cancer Treatment	
Oncology Management	
Radiation Treatment and Content for Neoplasms Originating in Following Sites: <ul style="list-style-type: none"> • Head and Neck • Central Nervous System • Breast • Lymphoreticular • Hematopoietic • Respiratory • Integumentary • Gastrointestinal • Genitourinary • Reproductive 	

<ul style="list-style-type: none"> • Musculoskeletal • Emergencies • Special Considerations • Metastatic and Palliative Treatment Approaches 	
--	--

VII. Cross-Sectional Anatomy	
Professional Curriculum	Program Course(s)
Anatomic Directional Terms	
Anatomic Position and Scan Planes	
Brain	
Head and Neck	
Thorax	
Abdomen	
Pelvis	
Extremities	

VIII. Imaging for Radiation Oncology	
Professional Curriculum	Program Course(s)
Basic Principles of Radiographic Imaging	
Computed and Digital Radiography	

Computed Tomography (CT)	
Magnetic Resonance Imaging (MRI)	
Ultrasound	
Nuclear Medicine	
Medical Image Display and Storage	

IX. Acquisition of Patient Data and Treatment Preparation	
Professional Curriculum	Program Course(s)
Simulation and Localization	
Treatment Planning Preparation	

X. Computers and Computer Networking	
Professional Curriculum	Program Course(s)
Terminology and Data Representation	
Computer Hardware	
Computer Software	
Networking	
Data Security	

XI. Atomic and Nuclear Physics

Professional Curriculum	Program Course(s)
Basic Elements and Atomic Structures	
Classification of Atoms	
Nuclear Stability	
Radiation Definition	
Radioactive Decay	
Nuclear Reactions and Descriptions	
Radioactive Series	
Various Forms of Radioactive Equilibrium	
Artificial Production of Radionuclides	
Linear Energy Transfer and Stopping Power	
Ionizing Radiation	
X-ray Interaction with Matter	
Photon Beam Attenuation and Coefficient	
Particle Interactions with Matter	

XII. Dose Measurement-External Beam

Professional Curriculum	Program Course(s)
Exposure	
Absorbed Dose	
Phantom Materials	
National Standards	
Dose Measurement	
Instrumentation – External Beam Dose	
In Vivo Dosimetry	
Dynamic Dose Measurement Devices	
External Beam Data Collection	

XIII. Treatment Machines and Simulators

Professional Curriculum	Program Course(s)
External Beam Delivery Machine Design and Theory of Operation	
Simulators	

XIV. Isodose Distributions

Professional Curriculum	Program Course(s)
Isodose Chart	
Parameters of Isodose Curves	
Beam Modification	
Heterogeneity Corrections	
Field Arrangement and Isodose Curves	
Treatment Planning Specifications Affecting Isodose Distributions	
Matching Adjacent Fields	
General Treatment Planning Principles	
Integral Dose	

XV. Clinical Application of Electron Beams

Professional Curriculum	Program Course(s)
Production of Clinically Useful Electron Beams	
Beam Parameters	
Clinical Characteristics of Electron Beams	
Electron Beam Treatment Planning	

Dosimetric Considerations with Adjacent Fields	
Beam Algorithms for Electron Beam Calculations	
Shaping of Treatment Fields	

XVI. External Beam Dose Calculations	
Professional Curriculum	Program Course(s)
Dosimetric Quantities	
Methods of Beam Calibration	
Concept of Equivalent Square	
MU Calculation Techniques	
Dose to Any Point Along the Central Axis	
Dose Calculation Under Various Circumstances	
Applying Heterogeneity Corrections in Dose Calculations	
Field Matching in Adjacent Fields	
Dose Correction Calculations in Treatment Errors	

XVII. Brachytherapy

Professional Curriculum	Program Course(s)
Brachytherapy Radionuclides	
Types of Brachytherapy Applications	
Treatment Planning	
Recommendations	

XVIII. Radiation Biology

Professional Curriculum	Program Course(s)
Introduction	
Radiation Effects	
Radiosensitivity and Response	
Biologic Principles of Radiation Therapy	

XIX. Treatment Planning

Professional Curriculum	Program Course(s)
Conformal Geometric Terminology and Concepts	
CT Treatment Planning	

Treatment Planning System Functionality	
Treatment Planning	
Plan/Dose Evaluation	
Isocenter Verification	
Record and Verify Computer System	
Intensity Modulated Radiation Therapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT)	
Tools to Improve Efficiency	
Adaptive Planning	

XX. Image-Guided Radiation Therapy (IGRT)	
Professional Curriculum	Program Course(s)
Historical Development and Rationale	
Components of IGRT	
Managing Inter-Fraction Organ Motion	
Managing Intra-Fraction Organ Motion	
Methods to Track Dose from IGRT During Treatment	
Coincidence of Imaging Isocenter and Treatment Isocenter	
AAPM Task Group	

XXI. Respiratory Motion Management

Professional Curriculum	Program Course(s)
Observation Methods	
Respiratory Motion in CT Imaging	
Management of Respiratory Motion	
Gating Methods	
Patient Training and Queues	
Breath Hold Technique for Target and Critical Structure Separation	

XXII. Proton Therapy

Professional Curriculum	Program Course(s)
Rationale for Proton Therapy and Clinical Applications	
Review Proton Interactions with Matter	
Treatment Equipment	
Treatment Planning	
Plan Evaluation	
Treatment Delivery	
Reports	

XXIII. Stereotactic Radiotherapy (SRT)/Stereotactic Radiosurgery (SRS)

Professional Curriculum	Program Course(s)
Components	
Methods of Delivery	
Clinical Applications	
Imaging and Localization	
Planning Process	
Reports	

XXIV. Stereotactic Body Radiotherapy (SBRT)/Stereotactic Body Radiosurgery (SBRS)

Professional Curriculum	Program Course(s)
Components	
Methods of Delivery	
Clinical Applications	
Imaging and Localization	
Planning Process	
Reports	

XXV. Craniospinal Irradiation (CSI)

Professional Curriculum	Program Course(s)
Clinical Applications of CSI	
Patient Positioning and Immobilization	
Treatment Modalities	
Planning Process	

XXVI. Total Body Irradiation (TBI)

Professional Curriculum	Program Course(s)
Clinical Indications	
Clinical Applications	
Patient Positioning and Techniques	
Planning Considerations	
Challenges of Treatment	
AAPM Task Group 29 Report 17	

XXVII. Total Skin Electron Irradiation (TSEI)

Professional Curriculum	Program Course(s)
Clinical Applications	
Patient Positioning, Immobilization, and Techniques	
Planning Considerations	
AAPM Task Group 30 Report 23	

XXVIII. Intra-Operative Radiation Therapy (IORT)

Professional Curriculum	Program Course(s)
Clinical Applications	
Techniques	
Planning Considerations	
AAPM Task Group 72 Report 092	

XXIX. Continuous Quality Improvement Program

Professional Curriculum	Program Course(s)
Components	
Reporting of Errors and Near Misses	

External Audit	
External Dose Calibration (Independent Verification of Dose)	
Personnel	
Policies and Procedures	
Peer Review	
Failure Modes and Effects Analysis (FMEA)	
Reports	

XXX. Quality Assurance of Equipment	
Professional Curriculum	Program Course(s)
Essential Task Group Reports	
Comprehensive QA for Radiation Oncology (TG 040)	
Protocol for Clinical Reference Dosimetry of High-Energy Electron Beams (TG 051 and addendum)	
Quality Assurance for Clinical Radiotherapy Treatment Planning (TG 053)	
High Dose-Rate Brachytherapy Treatment Delivery (TG 059)	
Quality Assurance for Computed Tomography Simulators and the Computed Tomography Simulation Process (TG 066)	
The Management of Respiratory Motion in Radiation Oncology (TG 76)	
Sterotactic Body Radiation Therapy (TG 101)	

Accelerator Beam Data Commissioning Equipment and Procedures (TG 106)	
The Role of In-Room kV X-Ray Imaging for Patient Setup and Target Localization (TG 104)	
IMRT Commissioning: Multiple Institution Planning and Dosimetry Comparisons (TG 119)	
Quality Assurance Tests for Prostate Brachytherapy Ultrasound Systems (TG 128)	
Quality Assurance of Medical Accelerators (TG 142)	
Beam Modeling and Beam Model Commissioning for Monte Carlo Dose Calculation-Based Radiation Therapy Treatment Planning (TG 157)	
The Use and QA of Biologically Related Models for Treatment Planning (TG 166)	
Quality Assurance for Image-Guided Radiation Therapy Utilizing CT-Based Technologies (TG 179)	
Quality Assurance of External Beam Treatment Data Transfer (TG 201A)	
Supplemental Task Group Reports	
Physical Aspects of Quality Assurance in Radiation Therapy (TG 024)	
Sterotactic Radiosurgery (TG 042)	
Clinical Use of Electronic Portal Imaging (TG 058)	
Intracranial Sterotactic Positioning Systems (TG 068)	
Intraoperative Radiation Therapy Using Mobile Electron Linear Accelerators (TG 072)	
Verification of Monitor Unit Calculations for Non-IMRT Clinical Radiotherapy (TG 114)	
PET/CT Acceptance Testing and Quality Assurance Testing (TG 126)	

Quality Assurance for robotic Radiosurgery (TG 135)	
Recommendations of the American Association of Physicists in Medicine on Dosimetry, Imaging, and Quality Assurance Procedures for ⁹⁰ Y Microsphere Brachytherapy in the Treatment of Hepatic Malignancies (TG 144)	
Quality Assurance for Nonradiographic Radiotherapy Localization and Positioning Systems (TG 147)	
Quality Assurance for Helical Tomotherapy (TG 148)	
Quality Assurance of US Guided External Beam Radiotherapy for Prostate Cancer ((TG 154)	
Recommendations on the Practice of Calibration, Dosimetry, and Quality Assurance for Gamma Stereotactic Radiosurgery (TG 178)	
The Selection, Use, Calibration, and Quality Assurance of Radionuclide Calibrators Used in Nuclear Medicine (TG 181)	
Clinical Commissioning of Intensity Modulated Proton Therapy Systems (TG 185)	
An Implementation Guide for TGI42 Quality Assurance of Medical Accelerators (TG 198)	
Independent Calculation-based Dose/MU Verification for IMRT Medical Physics (TG 219)	
Comprehensive Proton Therapy Machine Quality Assurance (TG 224)	
Recommendations on Best Practices for AI and Machine Learning for Computer-Aided Diagnosis in Medical Imaging (TG 273)	
Magnetic Resonance Imaging Simulation in Radiotherapy: Considerations for Clinical Implementation, Optimizations, and Quality Assurance (TG 284)	
Surface Guided Radiotherapy (TG 302)	

XXXI. Research Methodology	
Professional Curriculum	Program Course(s)
Ethical Principles and Legal Considerations	
Style of Writing	
Identifying a Topic	
Framing the Problem and Alignment	
Types of Research Studies	
Research Design and Data Collection	
Data Analysis	
Dissemination of Findings	

Educational programs in medical dosimetry are **recommended** to incorporate college-credit bearing general education courses in efforts to build a solid foundation for the medical dosimetry curriculum. It is recommended that the following postsecondary general education coursework be delivered prior to the professional curriculum.

Recommended Post-secondary General Education	Credit Hour	Course Number	Course Title
Anatomy & Physiology			
Biology			
Mathematics			
General Physics			

Written or Verbal Communication			
Observation Hours			
Total Hours for Recommended Postsecondary General Education			