Radiation Oncology
Initial Certification Qualifying (Computer-Based) Examination:
Study Guide for Medical Physics for Radiation Oncology

This exam tests your knowledge of the principles of medical physics underlying the practice of radiation oncology. Included are questions on the general domains listed below. Exam performance will be reported to you based on an overall pass: fail grade, with specific information provided regarding quintile performance in the five individual domains. Because the nature of scientific knowledge and subcategories are such, there may be some overlap of items across domains. Each exam will include items from every domain, but individual subtopics may not be included in every exam.

Primary Domains:

I. Basic physics
II. Radiation measurements and basic treatment planning
III. Imaging, simulation, and treatment plan evaluation & verification
IV. Advanced treatment planning & special procedures
V. Safety, QA, and radiation protection

I. Basic physics

A. Fundamental Physics
B. Atomic and Nuclear Structure
C. Production of Kilovoltage X-ray beams
D. Production of Megavoltage X-ray beams
E. Radiation Interactions

II. Radiation measurements and basic treatment planning

A. Radiation Quantities and Units
B. Radiation Measurement and Calibration
C. Photon Beam Characteristics and Dosimetry
D. Electron Beam Characteristics and Dosimetry

III. Imaging, simulation, and treatment plan evaluation & verification

A. Imaging Fundamentals
B. Simulation and Treatment Verification
C. Informatics
D. Prescribing, Reporting, and Evaluating Radiotherapy Treatment Plans

IV. Advanced treatment planning & special procedures

A. Intensity Modulated Radiation Therapy (IMRT)
B. Special Procedures
C. Brachytherapy
D. Particle Therapy
E. Stereotactic Radiosurgery/Stereotactic Body Radiation Therapy

V. Safety, QA, and radiation protection

A. Quality Assurance
B. Radiation Protection and Shielding
C. Safety and Incidents

References: References are intended as resource for exam takers and will form the sources for the majority of individual items in the exam. Individual items may be sourced from references not cited in this study guide. Primary references are intended to be the source of the majority of exam items. Secondary references are individual smaller categories of items. Additional references may be the source of individual, selected items.

Primary References:

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Secondary References:

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Additional References:

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United States Code of Federal Regulations, Title 10, Chapter 1 – Nuclear Regulatory Commission, Part 20 – Standards for Protection Against Radiation. https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/

United States Code of Federal Regulations, Title 10, Chapter 1 – Nuclear Regulatory Commission, Part 35 – Medical Use of Byproduct Material. https://www.nrc.gov/reading-rm/doc-collections/cfr/part035/