2023 Test Specifications Matrix

Details of the findings for categories and subcategories are outlined below.

MDCB CMD Test Specifications Matrix Derived from the 2023 Job Task Analysis	
Domain	**Weight**
I: Radiation Physics	14%
1. Identify the types of radioactive decay (e.g., alpha, beta, gamma)	
2. Describe the production of X rays and particle beams	
3. Differentiate between the characteristics of X rays and particle beams (e.g., attenuation, stopping power)	
4. Distinguish between the types of interaction of radiation with matter	
5. Identify treatment machine characteristics (e.g., gamma source, HDR, LINAC, MR, proton, photon, orthovoltage and superficial X-rays)	
6. Recognize geometric characteristics (e.g., magnification, minification)	
7. Recall half-lives of radioactive elements (e.g., cesium, iridium)	
8. Distinguish between imaging modalities (e.g., CBCT, CT, KV/MV, MRI, PET, SGRT)	
9. Recognize the relationship between the Hounsfield unit and the CT density table	
10. Calculate radiation computations (e.g., absorbed dose, activity, dose equivalent, exposure, HVL, radiation units)	
II: Localization	8%
1. Manage patient data (e.g., assess, import, translate, validate)	
2. Consult on patient positioning	
3. Consult on patient immobilization and motion management techniques	
4. Assess simulation parameters (e.g., adequate prep, complete data sets, full treatment windows)	
5. Evaluate rigid image registration, deformable registration, and image fusion	
6. Describe IGRT techniques (e.g., CBCT, CT on rails, fiducials, fluoroscopy, infrared, KV-KV, MV-MV, SGRT, ultrasound guidance)	
7. Construct localization of patient within treatment planning system (TPS)	
III: Treatment Planning	42%
1. Evaluate isodose distributions and dose metrics	
2. Recall site specific clinical oncology (e.g., anatomy, common treatment techniques, disease, dose and fractionation schemes modes of spread)	
3. Review radiobiology (e.g., BED, dose tolerances, hypofractionation, LET, RBE, time dose fractionation calculation)	
4. Identify cross-sectional anatomy	
5. Recognize treatment delivery systems (e.g., advantages, limitations, machine differences)	
6. Define special treatment procedures (e.g., SBRT, SRS, TBI, TSEI/TBE)	
7. Describe planning methodologies (e.g., adaptive radiotherapy, compensator, electron, forward, inverse, MCO, robust planning, stereotactic)	
8. Identify OAR constraints under specific protocols (e.g., AAPM/TG-101, QUANTEC, RTOG, Timmerman)	
9. Describe computer systems management (e.g., archiving and backup, DICOM data transfer, routine maintenance, scripting)	
10. Discuss automated treatment planning processes (e.g., auto-contouring, auto-planning, scripting, templating)	
11. Define planning structures as outlined by ICRU	
12. Assess optimization functions (e.g., EUD, minimum and maximum DVH)	
13. Recognize implanted devices and their impact on planning (e.g., CGMs, fiducial, pacemakers, prosthetics, SpaceOAR gels)	

IV: Dose Calculation Methods	13%
1. Recognize external beam dose calculation and algorithms	
2. Analyze effects of beam modifying devices (e.g., bolus, compensators, Lucite, MLC, partial transmission blocks, wedges)	
3. Compute special calculations as needed (e.g., entrance/exit dose, gap calculations, off axis, re-treatments)	
4. Evaluate the need for corrections for tissue inhomogeneities and density overrides	
5. Evaluate deformable dose accumulations	
6. Identify sources of uncertainty and limitations in computer-based treatment planning (e.g., effects of dose grid matrices, calculation algorithms)	
V: Brachytherapy	5%
1. Identify radioactive source characteristics	
2. Describe HDR and LDR treatment and planning methods	
3. Identify brachytherapy treatment devices (e.g., cylinder, interstitial breast, needles, seed applicators, T&O, vaginal cuffs)	
4. Recognize surveying requirements (e.g., background pre- and post-implant, bedside dose, shielding)	
5. Recognize the role of the NRC and state regulations in dosimetry	
6. Compute brachytherapy calculations	
VI: Radiation Protection	9%
1. Cite ALARA and maximum permissible dose equivalent based on NCRP recommendations and regulatory guidelines (e.g., ICRU, NCRP)	
2. Cite mandatory radiation monitoring requirements for personnel and patients (e.g., worker, non-worker, pregnant worker)	
3. Explain the rationale for treatment vault design requirements (e.g., primary- vs secondary-barrier)	
4. Identify types of radiation detectors	
VII: Quality Assurance & Standard of Care	9%
1. Recognize the purpose of treatment machine commissioning and quality assurance in relation to patient safety	
2. Review plan checks, charts and images	
3. Differentiate types of measurement equipment (e.g., diodes, ion chambers, survey meters, TLD)	
4. Utilize record and verify systems and EMR	
5. Recognize the steps of treatment beam QA measurement and analysis (e.g., electron cut out factors, IMRT)	
6. Identify scope of practice based on AAMD Scope of Practice document and AAMD Practice Standards document	
7. Describe incident reporting process for patient safety (e.g., process improvement, quality improvement, RO-ILS, root cause analysis)	
8. Identify factors and limitations of deliverable plans	
9. Recognize QA requirements of simulation and treatment equipment	