All Tasks must be completed **and signed-off** during clinical internship.
Journals submitted without sign-off will be returned to student and will delay graduation. AMA Format is used to cite sources for research. All student work must be approved by CMD or other credentialed practitioner before applying to patient treatment. Any patient care competencies require **Direct Supervision** by qualified practitioner.

Radiation Protection and Radiation Safety

#	Task(s) / Discussion points	Deliverable	Sign-off	Date
R1	Sample analysis by Scintillation Detection (a) Detector response vs. energy (b) Statistical considerations (c) USNRC leak test requirements (d) Sample preparation (e) Data analysis (f) Result interpretation	*Observe wipe sample counting or bioassay, if possible *Discuss in journal		
R2	Personnel Dosimeters: Photon/Electron (a) Detector types and properties (b) Gamma-ray energy response (c) Dose response (d) Stability and reproducibility	*Observe badge exchange, if possible *Discuss in journal		
R3	Personnel Dosimeters: Neutron (a) Detector types and properties (b) Neutron energy response (c) Dose response (d) Dose-equivalent response (e) Stability and reproducibility	*Discuss in journal		
R4	Neutron Survey Instruments (a) Dose equivalent response: Bonner Sphere (b) Energy independent response: Long Counter (c) Calibration: Pu-Be (d) Effective center and neutron response (e) Data analysis and interpretation	*Identify and discuss the use of any neutron survey equipment to which you have access if possible *Discuss in journal		
R5	Dose Estimates from Diagnostic Imaging Procedures (a) Fetal dose calculations (b) Pediatric dose issues (c) Risk estimates	*Discuss in journal *Provide a sample dose estimate for each point *Discuss in journal		

R6	Points of Concern during Therapy (a) Pacemakers and the radiation field (b) Dose estimates near prosthetics (c) Large patients and skin reaction (d) TPS model accuracy issues	*Discuss in journal		
R7	Other	*Discuss in journal		
R8	Other	*Discuss in journal		
R9	Other	*Discuss in journal		

Diagnostic Imaging and Quality Assurance

#	Task(s) / Discussion points	Deliverable	Sign-off	Date
D1	X-Ray production and Machine Output (a) Ionization chamber measurement (b) Effects of kVp, mA, exposure time (c) Effects of filtration (d) Measurement of half-value layer	*Discuss in journal		
D2	Radiographic Film Contrast (a) Densitometry, sensitometry (b) Effects of kV, mA, exposure time (c) H & D curves (d) Processor	*Discuss in journal		
D3	Scatter Reduction (a) Grids (b) Air Gap (c) Collimation	*Discuss in journal		
D4	Radiographic/Fluro Quality Control (a) Focal spot size (b) Radiation/light field (c) Reproducibility, linearity (d) Dose calculation (e) Voltage measurement (f) Tomography, cine, rapid film changers (g) Fluoroscopy (h) Mammography (i) Dental	*Discuss in journal		
D5	Computed Tomography (a) Imaging principles (b) Slice thickness (c) High and low contrast resolution (d) Beam profiles (e) Dose measurements (f) Helical z-axis characterization (g) Positioning light alignment (h) QC and accreditation (i) AAPM TG-66	*Identify your site's CT equipment and review the site plan if possible *Discuss in journal		
D6	CT daily tests	*Observe if possible *Document and discuss		
D7	Portal Imaging QA (a) TG-58	*Observe if possible *Document and discuss		

D8	Other	*Observe QA, if possible *Document and discuss		
D9	Other	*Observe, if possible *Document and discuss		
D10	Other	*Observe, if possible *Document and discuss		
D11	Other	*Observe, if possible *Document and discuss		
D12	Other	*Observe QA, if possible *Document and discuss		

Body-Site-Specific Imaging

#	Site	Deliverable	Sign-off	Date
SI1	CT Sim 1: Prostate	*Observe/Assist if possible *Document/Discuss in Journal		
SI2	CT Sim 2: Lung	*Observe/Assist if possible *Document/Discuss in Journal		
SI3	CT Sim 3: Head/Neck	*Observe/Assist if possible *Document/Discuss in Journal		
SI4	CT Sim 4: Breast	*Observe/Assist if possible *Document/Discuss in Journal		
SI5	CT Sim 5: Brain	*Observe/Assist if possible *Document/Discuss in Journal		
SI6	CT Sim 6: Colon	*Observe/Assist if possible *Document/Discuss in Journal		
SI7	CT Sim 7: Gyn	*Observe/Assist if possible *Document/Discuss in Journal		
SI8	CT Sim 8: Extremity	*Observe/Assist if possible *Document/Discuss in Journal		
SI9	CT Sim 9: Electron field	*Observe if possible *Document/Discuss in Journal		
SI10	Special Procedure Simulation (e.g Respiratory Gating, SRS, SBRT)	*Observe if possible *Document/Discuss in Journal		
SI11	Other	*Observe/Assist if possible *Document/Discuss in Journal		

Nuclear Medicine Instrumentation and Quality Assurance

#	Task(s) / Discussion points	Deliverable	Sign-off	Date
NM1	Radioisotope Calibrator (a) Quality control: Constancy, linearity, accuracy (b) Wipe testing of radionuclide standards	*Observe dose preparation or calibration QA, if possible *Discuss in journal		
NM2	SPECT (a) Quality control: Center-of-rotation calibration and high-count floods (b) Comparison of planar and tomographic spatial resolution (c) Measurement of field uniformity, RMS noise, accuracy of attenuation correction, and contrast	*Observe QA, if possible *Discuss in journal		
NM3	PET (a) Quality Control (b) Measurement of singles rate, RMS noise, and contrast	*Observe QA, if possible *Discuss in journal (one page write up)		

Radiation Therapy Physics: Instrumentation, QA, and Clinical Studies

#	Task(s) / Discussion points	Deliverable	Sign-off	Date
T1	* Attend multidisciplinary cancer conferences / tumor boards and weekly peer review * Perform one chart check weekly	*Attend *Perform *Provide documentation		
T2	Calibrate a linac photon beam using TG-51 protocol	*Observe or Research *Document and discuss		
T3	Calibrate an electron beam (start with determining energy) using TG-51	*Observe or Research *Document and discuss		
T4	Calibrate and perform two clinical TLD measurements	*Observe TWO (If not available, research topic) *Document and discuss		
T5	Perform Mechanical QA	*Observe or Research *Document and discuss		
T6	Hand calculate MU for five photon non-IMRT clinical cases	*Calculate *Document and discuss		
T7	Hand calculations: * Calculate three cases of irregular photon fields by hand, checking with your second-check program * Calculate at least 10 (or as many as possible) other actual patient plans by hand. Only 5 of the 10 can be electron plans.	*Calculate *Document and discuss		
T8	Dose modeling for external photon and electron beams; determine the models used for your TPS	*Discuss your TPS in your journal		
T9	*Observe your site's daily linac tests *Shadow procedure at least three times	*Observe or Research *Document and discuss		
T10	*Observe your site's monthly linac tests *Perform full procedure at least one time if not already covered above	*Observe or Research *Document and discuss		

T11	Perform a linac annual test (if you are able to do so) If not possible, review your linac last annual test documents	*Observe or Research *Discuss the procedure and results in journal		
T12	Patient IMRT QA with your physicist *Observe at least two *Perform at least one	*Observe or Research *Document and discuss		
T13	Review badge reports; Review ALARA notifications, if any; Review provisions for protection of pregnant workers	*Discuss		
T14	Perform routine QA of any device not listed above (e.g. a block cutter)	*Observe or Research *Document and discuss		
T15	Follow one electron case from new start to delivery (a) New Start (b) Weekly chart checks (c) Simulation (d) Block or cutout manufacture (e) Treatment planning (f) Delivery (g) Patient-specific QA (h) Patient follow-up	*Observe if possible *Document and discuss		
T16	Calculate a rotational photon beam average TMR manually and check with your second-check program	*Calculate *Document and discuss		

Treatment Planning

If your site performs brachytherapy and external beam for a given body site, plan and review one plan of each. You may use 2D, 3D, IMRT, or VMAT as appropriate. All competencies designated **MANDATORY** must be completed on a patient for successful completion of Clinical Internship. Each **MANDATORY External Beam** competency must be accompanied by a Mandatory Competency Evaluation Form. All student work must be approved by CMD or other credentialed practitioner **before** applying to patient treatment.

#	Site	Deliverable	Sign Off	Date Completed
P1	Prostate IMRT/VMAT **MANDATORY**	Plan and Plan Review		
P2	Pelvis (3 field) with wedges-**MANDATORY**	Plan and Plan Review		
P3	Pelvis (4 field)- **MANDATORY**	Plan and Plan Review		
P4	Lung (3D Conformal or IMRT/ VMAT) - **MANDATORY**	Plan and Plan Review		
P5	Head & Neck (primary) (Bilateral Nodes) IMRT/VMAT-**MANDATORY**	Plan and Plan Review		
P6	Breast (Intact) Tangentials- **MANDATORY**	Plan and Plan Review		
P7	Brain (Primary)- (3D Conformal or IMRT/ VMAT) - **MANDATORY**	Plan and Plan Review		
P8	Gyn-**MANDATORY**	Plan and Plan Review		
P9	Extremity Limb Melanoma/Sarcoma (3D Conformal or IMRT/ VMAT) **-MANDATORY**	Plan and Plan Review		
P10	Abdomen (e.g. Pancreas, GE Junction) (3D Conformal or IMRT/VMAT) **MANDATORY**	Plan and Plan Review		
P11	Lymphoma- **MANDATORY**	Plan and Plan Review		
P12	Electron Beam Planning- **MANDATORY**	Plan and Plan Review		
P13	Para-aortic or Nodal Irradiation- (3D Conformal or IMRT/ VMAT) - **MANDATORY**	Plan and Plan Review		
P14	Fusion Plan- (MRI, PET, etc.) **MANDATORY**	Plan and Plan Review		
P15	Esophagus (IMRT/VMAT)- **MANDATORY**	Plan and Plan Review		

P16	Craniospinal - **MANDATORY**	Plan and Plan Review		
P17	Stereotactic Body Radiation Therapy (SBRT) - **MANDATORY**	Plan and Plan Review		
P18	Palliative (Brain, Spine, etc.)-**MANDATORY**	Plan and Plan Review		
P19	Chest Wall Tangentials/ VMAT w/ Supraclavicular and Axilla Fields- **MANDATORY**	Plan and Plan Review		
P20	Re-irradiation or Composite Plan-**MANDATORY**	Plan and Plan Review		
P21	Brain (Whole Brain) or Spine-**MANDATORY**	Plan and Plan Review		
P22	Pelvis & Nodes SIB (IMRT/VMAT) **MANDATORY**	Plan and Plan Review		

Special Procedures

A minimum of two brachytherapy procedures (one interstitial and one intracavitary) are **MANDATORY.** If not available in your clinic, please review videos provided by the school. **A Mandatory Competency Evaluation Form is not required.**

#	Task(s) / Discussion points	Deliverable	Sign-off	Date
SP1	Brachytherapy: Interstitial-Seed Implant (a) Observe implant or volume study, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP2	Brachytherapy: HDR Breast or Prostate (a) Observe implant, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP3	Brachytherapy: Intracavitary (LDR or HDR Gyn) (a) Observe implant, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP4	Stereotactic: Brain (SRS) (a) Observe procedure, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP5	Stereotactic: Body (SBRT) (a) Observe procedure, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP6	Intraoperative Irradiation (IORT) (a) Observe procedure, if possible (b) Review a plan	*Observe or Research Topic *Document and discuss in journal		
SP7	Respiratory Gaiting: 4D CT (a) Observe procedure, if possible (b) Review a plan and treatment on the machine	*Observe or Research Topic *Document and discuss in journal		

SP8	If you are able to perform or observe any other procedures of interest. (Proton, TBI, TSET, EBCT, Arc Therapy, Tomotherapy, VMAT, Hodgkin's Lymphoma, Grid Therapy, Craniospinal, Re-irradiation, Composite planning, Prone Breast, etc.)	*Document and discuss		
SP9	Other:	*Document and discuss		