



**University
of Victoria**



BC Cancer Agency
Medical Physics - Vancouver

Physics 535 Syllabus

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Required text: none

References:

1. The Physics of Radiation Therapy, 3rd or 4th Edition, Faiz M. Khan, Lippincott, Williams and Wilkins, 2003 or 2009
2. The Physics of Radiology, 4th Edition, Harold E. Johns and John R. Cunningham, Charles C Thomas Publishers, 1983
3. Handbook of Radiotherapy Physics: Theory and Practice. Philip Mayles, Alan Nahum, Jean-Claude Rosenwald, eds. Taylor and Francis, 2007.

Outline

1. Introduction to Radiation Therapy Treatment Planning and Delivery
 - the radiation therapy process: treatment planning and delivery
 - patient immobilization and set-up techniques
 - patient data acquisition methods
 - definition of target and organs at risk
2. Photon Beam Treatment Planning: Principles and Methodology
 - properties of therapeutic photon beams
 - dosimetric functions and single beam, central axis point dose calculations
 - multiple beam treatment planning; field matching
 - off-axis, missing tissue, and inhomogeneity corrections
3. Electron Beam Treatment Planning: Principles and Methodology
 - properties of therapeutic electron beams
 - point dose calculations
 - shielding, bolus, oblique incidence, and inhomogeneities
4. Computerized External Beam Treatment Planning
 - calculation algorithms
 - plan optimization
5. Brachytherapy
 - apparatus, radioactive sources, delivery techniques
 - dose calculation
 - fundamentals of treatment planning

6. Special Techniques
 - proton beam therapy
 - moving beam therapy (photon and electron arcs and scanning beams)
 - total body photon and electron irradiation
 - stereotactic radiotherapy / surgery (linac, cyberknife, gamma Knife)
 - tomotherapy
 - intensity modulated radiation therapy: optimization, fixed field delivery, arc delivery
 - motion management: gating, coaching, and breath hold techniques

7. Clinical Application of Imaging Technologies in Radiation Therapy
 - CT and conventional simulation
 - MRI, PET, and ultrasound imaging in treatment planning and delivery
 - image fusion, registration, and deformation
 - 4D CT
 - kV and MV portal imaging
 - kV and MV cone beam CT

8. Radiation Therapy Errors and Radiation Accidents

EVALUATION:

Assignments - 70%

Final Exam- 30%