The rapid increase in the complexity of treatment planning is a reflection of recent advances in the clinical technology. These include the use of multi-modality and 4D imaging for planning, advanced treatment delivery and imaging capabilities available now on many linear accelerators. Intensity modulated radiotherapy (IMRT), already the most common form of treatment at some institutions, is increasingly being combined with other complex treatment capabilities such as respiratory monitoring or control, in-room 2D or 3D imaging, or intra-fractional patient motion monitoring.

Successful integration of any of these methods into the clinic relies on the increasing sophistication and ability of treatment planning staff to design and prepare not just the dose distribution but all data and images required for treatment. Although IMRT optimization and leaf sequencing algorithms are fairly mature, confidently identifying an “optimum” plan and appropriately evaluating the normal tissue and target trade-offs can still be difficult and time consuming particularly for complex cases. Complex treatment procedures such as image-guided treatment or respiratory monitoring can present a substantial challenge in terms of the effort required to manage, evaluate and appropriately use the many image sets acquired during planning and treatment. Dose escalation protocols and stereotactic body radiosurgery programs are being initiated at more institutions. Each of these demands a careful evaluation of initial and daily patient preparation and setup and a thorough understanding of the uncertainties associated with planning and treatment.

This course will focus on strategies and techniques for coping with some of the more complex planning issues that arise in today’s technology-intensive department on all stages, from planning image acquisition to dose delivery.

Learning Objectives:

1. Understand the trade-offs in IMRT planning and the role of target/normal tissue geometry and beam geometry in creating IMRT plans
2. Understand the increasing role of treatment planning staff in the analysis, use and preparation of images for planning and treatment
3. Identify sources of inter- and intra-fractional uncertainty and their impact on dose escalation and stereotactic body radiosurgery programs