Both the enhanced dynamic wedge (EDW) and virtual wedge (VW) treatment modalities produce a profile similar to that of a physical wedge by varying the jaw position and/or output rate during treatment. When compared with physical wedges, these non-physical wedges have several clinically relevant advantages including reduction of treatment time, less scatter dose to peripheral areas and, in many cases, extended field size capabilities. Non-physical wedges also have potential roles in intensity modulated radiation therapy.

The current version of EDW allows for seven possible wedge angles using segmented treatment tables (STTs) which govern the output rate at each position of the moving jaw during treatment. In contrast, the VW offers a continuous selection of wedge angles, produced using an exponential variation of the accelerator output rate based on an analytic equation.

For monitor unit calculations, the inclusion of a single VW or EDW factor is required. In contrast to the wedge factors determined for physical wedges, the EDW factor is strongly dependent on field size, varying by up to a factor of two for the 60^{o} EDW. The VW factor is very close to unity for symmetric fields. For asymmetric fields, the VW factor demonstrates a much greater variation with off-axis distance than that of EDW.

Most treatment planning systems (TPS) are not originally designed to include non-physical wedge modalities. However, one can incorporate VW/EDW into most of the current systems using TPS-specific methods. Possible methods include photon fluence modeling, physical wedge emulation, and synthesis of two basic wedges. Source modeling plays a more important role in dose computation accuracy for narrow off-axis fields, which are rarely used in static treatments but heavily used in VW/EDW treatment. The dynamic nature of these treatments also post some unique concerns in commissioning and treatment. Because of the considerable differences between physical and non-physical wedges in both their dosimetry and operation, it is vital that clinical physicists gain a thorough understanding of non-physical wedges for their safe and accurate clinical application.

Education objectives:

1. Principles and operations of Enhanced Dynamic Wedge (EDW) and Virtual Wedge (VW).
2. Wedge factor characteristics of EDW and VW for MU calculations in symmetric and asymmetric fields.
3. Non-physical wedge beam profile measurements and QA.
4. Commissioning of non-physical wedges in treatment planning systems.
5. Issues and concerns with routine clinical implementation of EDW and VW.