

E6 225 Advanced Power Electronics (3:0)

The objective of this course is to understand operation of power electronic converters used in medium and high-power applications. Topology and modulation strategy for finding gain and to compute stresses in various circuit components and dynamic modelling for design of closed loop controllers. This course includes analysis of a) isolated DC-DC converters: Phase-Shifted-Full-Bridge (PSFB), Resonant (SRC, PRC, LLC), Dual-Active-Bridge (DAB) b) DC-AC converters: Single-phase and three phase-two level and multilevel (NPC, Cascaded-H bridge, MMC, Flying capacitor) voltage source inverters, current source inverters c) DC-AC: PWM rectifiers-Boost-Power Factor Correction (PFC), Bridge-less PFC, three-phase-active front-end rectifiers. Control of grid-tied inverters (grid following, grid forming, synchronverter etc.). Multi-pulse line commutated rectifiers d) AC-AC converters: Back-to-back and matrix converter.