The aim of this tutorial is to provide fundamentals of design for reliability of power electronic systems, together with the recent findings and paradigm shifts in this research area. It will cover the reliability requirements in different industry sectors, reliability and lifetime of semiconductor modules and capacitors used in power electronic converters, testing of power components, and the specific design-for-reliability procedure for power electronic systems. A hands-on example of reliability stimation, as long as some case studies on the design-for-reliability paradigm are also presented. Finally, cuttingedge mission-profile based lifetime estimation as well as condition monitoring principles in power converters will conclude the tutorial. The approaches presented are also the common interest for the companies involved in the Center of Reliable Power Electronics (CORPE) at Aalborg University (http://www.corpe.et.aau.dk/). The tutorial will also present the views of the instructors on future research opportunities in the area of reliability of power electronics. Researchers and engineers who seek the basic knowledge for entering in this field, ranging from component level to system level, from physic of failure to statistical analysis are the main target audience of the seminar. Prerequisites are: circuit theory and power electronics basics.