Power electronics is a fast developing technology within the electrical engineering field. This paper presents the results and experiences gained from Design-Oriented Project Based Learning of switch-mode power supply design within a power electronics course at the Technical University of Denmark (DTU). Project-based learning (PBL) is known to be a motivating and problem-centered teaching method that not only places students at the core of the teaching and learning activities but also gives students the ability to transfer their acquired scientific knowledge into industrial practices. Students are asked to choose a specification from different power converter applications such as a fuel cell power conditioning converter, a light-emitting diode (LED) driver or a battery charger. Based upon their choice, the students select topology, design magnetic components, calculate input/output filters and design closed-loop controllers in order to fulfill the requirements listed in the chosen specification; thereby meeting the corresponding project’s goals. In this paper, the course teaching plan and teaching methods are introduced, the assessment method is analysed and feedback from the students is studied.