Silicon-based photonics have generated a growing interest with impressive results on passive and active devices in the last years. The main applications are optical communications, optical interconnects in microelectronic circuits and biosensing. One of the rationales of the used of silicon photonics is the reduction of photonic system cost thanks to the high density integration of silicon devices and the used mature technology. Furthermore, the integration of photonic components and an electronic integrated circuit (EIC) on a common chip can also enhance the integrated chip performances. During this seminar, I will present the different possibility to perform optical modulation in silicon or on silicon. Electro-refraction and –absorption can be used in group IV materials (Si, Ge) and I will give you the main advantages and drawbacks of each effect. The second part of the talk will be focus on photodetection in silicon. Several approaches will be presented: Germanium, silicon doped, III-V on silicon. Furthermore, I will give you an overview of the activities on silicon photonics for the definition of high speed optical link and also on the possible ways to integrate photonic and electronic in the same circuit.