Erasure codes have traditionally been studied in the context of communication theory, but have also increasingly been used to ensure the reliability of distributed storage systems, since they provide a good trade-off between storage overhead (or rate) and reliability in case of storage node failures. Over the past years, there has been a vibrant research activity around the problematic of designing good storage erasure codes, amenable to repair. The main contribution of this thesis is to introduce a family of storage codes that generalizes the framework of collaborative repairs, which subsumes the previously known constructions with either no collaboration (one failure at a time) or full collaboration (several failures at a time, involving all repair nodes in the collaboration). The motivation is twofold: to allow more degrees in freedom in the code design to best suit possible storage system requirements, and to trade gain in repair bandwidth with security impairments that typically appear in the presence of collaboration. The degree of collaboration is studied as a function of the confidentiality one would like to obtain in the presence of eavesdroppers.

Date: 27 November 2015 (Friday)
Time: 10am
Venue: NTU SPMS MAS Executive Classroom 1, MAS-03-06
Supervisor: Assoc Prof Frederique Oggier