Abstract:

An \((n, k, \ell)\)-design is a family of \(k\)-sets of \([n]\) such that every \(\ell\)-set is covered precisely once. The problem of determining whether or not there exists a design for a given set of parameters is a classical and difficult question in combinatorics. We ask a variant of this problem. Namely, given \(k, \ell\), can one find a family of \(k\)-sets of \([n]\) covering every \(\ell\)-set at least once that has “approximately” as many sets as an \((n, k, \ell)\)-design would have?

In this talk we will solve the above problem using the technique known as the Rödl nibble. As time permits we will also discuss other problems in design theory, as well as other applications of the Rödl nibble technique.