THE CATHOLIC UNIVERSITY OF AMERICA
Washington, DC 20064

SEMINAR IN FUNCTIONAL ANALYSIS

AND RELATED AREAS

Wednesday, November 1, 2023

4:45 p.m. - 6:00 p.m.

SPEAKER: Dr. Peter Gartland
University of California, Santa Barbara

TITLE: Quasi-Polynomial Time Techniques for Independent Set and Beyond in Hereditary Graph Classes.

ABSTRACT: I will be presenting several results from my thesis in algorithmic graph theory this talk.
It was first observed by Alekseev in 1982 that Independent Set on H-free graphs is NP-Hard when H is not a forest of paths and subdivided claws. If Independent Set on H-free graphs when H is a forest of paths and subdivided claws can be done in (quasi) polynomial time has remained an open problem since then. In this presentation we will present a quasi-polynomial time algorithm for Independent Set on Pk-free graphs, then a quasi-polynomial time algorithm for Independent Set on H-free graphs where H is a forest of paths and subdivided claws.
Next, in a seemingly different thread of research, we will provide a characterization of graph classes with few minimal separators. A minimal separator is a set S such that there are two vertices u, v in different components of G−S and for any proper subset S′ of S, u and v are in the same component of G − S′. Many NP-Hard problems can be solved in polynomial time on graph classes with few minimal separators. As it turns out, the techniques used to give this characterization heavily overlap with those used in the quasi-polynomial time algorithms previously discussed.
I will conclude with some conjectures which describe how these approaches might be generalized to give a quasi-polynomial time algorithm for Independent Set on other graph classes for which efficient algorithms for Independent Set have long been sought but with no success, such as even-hole-free graphs and theta-free graphs.

The presentations will be given via Zoom. The corresponding link is as follows

https://cua.zoom.us/j/87627066209?pwd=cWxxTlpIVko5YitkbVo2V0crMXk3QT09

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