MATH COLLOQUIUM SERIES

School of Mathematical Sciences

Universiti Sains Malaysia

THEORY OF DOMINATION IN GRAPHS AND HYPERGRAPHS

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Background. Dr Nader Jafari Rad is a Professor of Mathematics and the head of the Department of Computer Science at Shahed University, Tehran, Iran. He received his PhD degree in Mathematics in the area of Graph Theory and Combinatorics from University of Mazandaran, Iran, in 2007. He started his career at Department of Mathematics, Shahrood University of Technology (SUT), Iran as an Assistant Professor. Prof. Nader then joined the Algorithms and Computations Group at Institute for Research in Fundamental Sciences (IPM), Iran in 2009 as a researcher. After working for 11 years at SUT, he moved to Shahed University, Iran in 2018. He has supervised 48 master students and 12 PhD students in different universities. He was appointed as an Academic Fellow of School of Mathematical Science, Universiti Sains Malaysia in 2021. He has worked on several topics such as extremal graph theory and Ramsey theory, algebraic graph theory, coding theory, and algorithms and complexity. His main research interests are domination theory in graphs and hypergraphs. To date, he has published more than 170 papers in Mathematics journals and two Springer Book-Chapters. He has collaborated with mathematicians from various countries, including Algeria, Canada, China, France, Germany, Poland, Spain and the United States.

Abstract. Theory of domination in graphs has experienced rapid growth since its introduction and is now a well-studied concept in graph theory resulting in over 4000 papers published by 2021. In this first talk, the idea of domination number will be introduced together with its historical backgrounds, applications and variations. A series of upper bounds of domination number in terms of the order of graph using different approaches will be presented. There are various upper and lower bounds involving the order of graph and other different graph variants. Also, in this talk, fundamental properties of dominating sets will be presented. Some recent progress relating to Vizing's conjecture and Vizing-like conjecture will be presented as well. The last part of this talk will cover some results on algorithmic and computational complexity aspects of domination number. The decision problem associated with domination number is NP-complete even when restricted to special families of graphs, including bipartite, split or chordal graphs. The next talk will be focused on transversals in hypergraphs and their relations with domination parameters.

Date: 14 September 2021 (Tuesday)
Time: 2:30-3:30 PM (Malaysia time)
Link: https://bit.ly/3z0neuu (Via Microsoft Teams)

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