A NATIONAL WORKSHOP ON

ALGORITHMIC COMBINATORIAL GAME THEORY (NWACGT 2024)

December 26, 2024 – January 04, 2025

CARAMS, MAHE will be organizing a one-week workshop, carrying a credit of 2 points, on the topic *'Algorithmic Combinatorial Game Theory'* during **December 26, 2024 – January 04, 2025**. The course will be organized in offline mode. Broadly, the NWACGT 2024 will concentrate on basic game theory as students with a broad background in Mathematics, Computer Science, Statistics, Economics, Political Science, and Biological Sciences could benefit.

Resource Persons

Prof. T. E. S. Raghavan
University of Illinois at Chicago

Prof. K. C. Sivakumar
Indian Institute of Technology Madras

Objective of the workshop: To provide a basic input on the following topics:

Combinatorial games, Nim Game and Bouton's solution of Nim, The game of Hex and Gale's solution, Game of Hex and the Brouwer's fixed point theorem, Two-person zero-sum normal form games and the geometry of convex sets, The Minimax Theorem and its meaning, Simplifying and solving zero-sum games, Completely mixed games. Pure optimal strategies: Saddle points, von Neumann's Minimax Theorem, Zero-sum games with infinite action spaces, Statistical decision functions, Basic feasible solutions and the simplex method for solving matrix games, Bimatrix games and Nash equilibria in mixed strategies, Repeated games, folk theorem and equilibria via threat strategies, Marriage and matchmaking, Stable matching and allocation, Algorithms for finding stable matchings, Cooperative TU games, The core, The Shapley value, Shapley's axioms, Shapley's Theorem, Nash bargaining, Nucleolus, Assignment games, Permutation matrices, Birkhoff von Neumann Theorem, Frobenius Konig's Theorem, Applications to optimal assignment problems, Algorithm to solve for the nucleolus in assignment games.

The course will be delivered through lectures on the topic in-depth and tutorials.

A limited number (up to 20) of seriously interested students (Doctoral/Post-doctoral) with a good background of Linear Algebra and Calculus will be selected for participation in the workshop. They having basic knowledge of Markov Chains and Continuous Time Discrete Stochastic Process is appreciated.

Note: Certificates will be issued only to the participants who complete the tutorial assignments.

Important Dates
Deadline for Registration: **December 15, 2024**
Submission of recommendation by Supervisor/HOD: **December 15, 2024**
Selection Intimation from Organizer: **December 20, 2024**

Registration Fee
2000 INR + GST

How to Register?: Enroll in our portal using the link http://carams.in/registration and then go to 'My Page' for further details such as guidelines for online fee payment, uploading of personal information, uploading abstract of talk, and any other relevant information.

Centre for Advanced Research in Applied Mathematics and Statistics
Level V, Health Sciences Library Building, Manipal Academy of Higher Education, Manipal-576 104 Karnataka, India

Associated Departments: Dept. of Applied Statistics and Data Science, PSPH, MAHE | Dept. of Mathematics, MIT, MAHE