MANIPAL
ACADEMY of HIGHER EDUCATION
(Institution of Eminence Deemed to be University)

CARAMS

A TWO - WEEK WORKSHOP ON

INTRODUCTORY APPLIED GAME THEORY
(IAGT 2023 - GURUKULAM)

December 11 - 25, 2023

CARAMS, MAHE (Statistics and Operations Research Chapter) will be organizing a two-week workshop (Gurukulam), carrying a credit of two points, on the topic '**Introductory Applied Game Theory (IAGT 2023)**' during **December 11 - 25, 2023**. This is in continuation of Prof. T. E. S. Raghavan's effort of organizing Gurukulam for the last few years. Broadly, the Gurukulam will concentrate on applied game theory as students with a broad background of Mathematics, Statistics, Computer Science, Economics, Political Science, and Biological Sciences could benefit.

Resource Person

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

The course will be delivered through lectures on the topic in-depth and tutorials. It will last for 15 days with 4 hours of lecture each day; 2 hours in the morning and 2 hours in the evening.

Objective of the workshop: The Gurukulam will be conducted in two parts; Gurukulam 1 and Gurukulam 2, with the aim of providing advanced input on topics in both Non cooperative and Cooperative Game Theory.

Gurukulam 1 will focus mainly on Non cooperative applications of Game Theory. Under zero-sum games, the topics of Combinatorial Games such as saddle points, mixed strategies, minimax theorem, and solving $2 \times n$ games by graphical method will be discussed. Under nonzero-sum games, prisoner's dilemma, battle of sexes, Aumann-Shapley Folk theorem model, domination, solving by trial-and-error approach, dominant strategies, utility theory, Nash equilibria in pure strategies, applications to determining Nash equilibria for duopoly models, open bid auction models, open bid on two objects and their Nash equilibria, Nash bargaining in two-person games and solving Nash bargaining in threat strategies, Nash equilibria in mixed strategies for bimatrix games, correlated equilibria, and evolutionary stable strategies in animal populations will be covered.

Gurukulam 2 will focus on topics in Cooperative Game Theory, such as applied algorithmic game theory for cooperative games, cooperative games with transferable utility, models of transferable utility games, measuring participant's importance in cooperative ventures, models of cooperative games in Ricardian economies, political cooperation and competition among competitors, characteristic function, imputation, domination, stable sets for 3 person games, Shapley value, core and the nucleolus as solutions for cooperative games, algorithms for computing the Shapley value, core and the nucleolus for some structured cooperative games in models of Ricardian economy, cooperative efforts to win elections, measuring the dominant mate among married couple, allocating costs among users of cooperative construction projects, resolving legal disputes among owners of joint property, and some graph theoretic tools needed for such solutions.

Minimum Requirement: Participant must have a strong background in two among the three areas: Matrix theory, Calculus, Elementary probability. Participants have to be physically present at the campus and have to be ready to
- Accomplish homework to be assigned
- Share the responsibility of typing the lecture material among them.

A limited number of seriously interested students (Doctoral/Post-doctoral/Faculty members who intend to introduce the subject of Game Theory in their Departmental courses) will be selected. A strong recommendation from their major professor is a must for being considered for the Gurukulam.

Registration Fee
Indian Students: **6000 INR + GST**
Foreign Students: **300 USD**

Accommodation
If required, will be arranged in the hostels at the occupant's expense.

Course Completion Criteria
- *100% attendance*
- *Submission of all the tutorial assignments*
Course credit: *2 points*

How to Register?: Enroll to IAGT 2023 in our portal using the link http://carams.in/registration. Visit 'My Page' for further guidelines for online fee payment, uploading of personal information, and any relevant information.

Important Dates
Deadline for Registration: **November 30, 2023**
Submission of recommendation: **November 30, 2023**
Selection Intimation from Organizer: **December 06, 2023**
Selection for Support: **December 10, 2023**

Student Support
Six students will be given waiver off registration fee. Aspirant may write to the Coordinator of CARAMS (kmprasad63@gmail.com) or to T E S Raghavan (terctu@gmail.com), immediately after the registration, attaching the necessary recommendation.

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

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

Organizing Secretary: Md Gulzar ull Hasan
Co-organizing Secretary: Varun Kumar S G
Convener: K Manjunatha Prasad

For details, visit
https://carams.in/events/iagt-2023/

Mail: carams@manipal.edu
carams.mahe@gmail.com
Phone: +91 820 2922407