Indian Institute of Technology Kanpur
Proposal for a New Course

1. Course No: ECO714

2. Course Title: Game Theory and Applications

3. Per Week Lectures: 3 (L), Tutorial: 0 (T), Laboratory: 0 (P), Additional Hours: 0
Credits: (3*L+T+P+A): 9 credits
Duration of Course: Full Semester Course

4. Proposing Department: Economic Sciences
Other Departments which may be interested: None

5. Proposing instructor(s): Faculty members of the Department of Economic Sciences
Level of the course: PG

6. Course Description:

A) Objectives: This course provides a comprehensive introduction to game theory and its applications. It covers rational decision making, static and dynamic games under complete and incomplete information, and explores applications in economics including auctions, mechanism design, matching, and market design.

B) Contents

S. No.	Broad Title	Topics	No. of Lectures
1.	Rational Decision Making and Game Preliminaries	Actions, outcomes, and preferences; Payoff functions; Uncertainty and expected payoff; Risk attitudes; Normal-form games; Matrix representation	5
2.	Static Games of Complete Information	Dominated strategies; Iterated elimination of strictly dominated strategies; Beliefs and best response; Rationalizability; Nash equilibrium in pure strategies; Mixed strategies; Nash existence theorem	8
3.	Dynamic Games of Complete Information	Extensive-form games; Subgame-perfect Nash equilibrium; Backward induction; Multistage games; Repeated games; Folk theorem; Strategic bargaining	8
4.	Static Games of Incomplete Information	Bayesian games; Bayesian Nash equilibrium; Adverse selection; Auctions (first-price, second-price, English, Dutch); Revenue equivalence; Winner's curse; Mechanism design; VCG mechanisms	8
5.	Dynamic Games of Incomplete Information	Perfect Bayesian equilibrium; Sequential equilibrium; Signalling games; Education signalling; Limit pricing; Building reputation; Cheap talk and information transmission	6
6.	Miscellaneous Applications	Matching theory; Deferred acceptance algorithm; Market design; Fair division; Cooperative game theory; Evolutionary game theory; IO applications	5

C) Prerequisites: None

D) Short summary for including in the Courses of Study Booklet: This course introduces game theory from its foundations in rational decision making through static and dynamic games of complete and incomplete information. Applications include auctions, mechanism design, signalling, reputation, bargaining, and matching markets.

7) Recommended textbooks:

- Game Theory: An Introduction by Steven Tadelis. Princeton University Press.
- A Course in Game Theory by Martin Osborne and Ariel Rubinstein. MIT Press.
- Game Theory by Michael Maschler, Eilon Solan, and Shmuel Zamir., 2nd edition. Cambridge University Press.
- Twenty lectures on Algorithmic Game Theory by Tim Roughgarden. Cambridge University Press. 2016

8) Any other remarks: None.

Dated: _____ Proposer: _____

Dated: _____ DUGC/DPGC Convener: _____

The course is approved / not approved

Chairman, SUGC/SPGC
Dated: _____