



COURSE PLAN – PART			
Name of the programme and specialization	B.TECH / CSE		
Course Title	Game Theory		
Course Code	CSPE53	No. of Credits	3
Course Code of Pre-requisite subject(s)	-	Semester	V
Session	July / <del>January</del> 2021	Section (if, applicable)	-
Name of Faculty	Dr. ELAKIYAE	Department	CSE
Official Email	<a href="mailto:elakiya@nitt.edu">elakiya@nitt.edu</a>	Telephone No.	-
Name of Course Coordinator(s) (if, applicable)	NIL		
Official E-mail	NIL	Telephone No.	NIL
Course Type (please tick appropriately)	Programme Elective Course		
<b>Syllabus (Approved in Senate)</b>			
<p><b>UNIT I Introduction to Game Theory</b>            Games and solutions - Game theory and mechanism design - Examples from networks - Strategic form games - Matrix and continuous games - Iterated strict dominance - Rationalizability - Nash Equilibrium - existence and uniqueness - Mixed and correlated equilibrium – Super modular games - Potential/congestion games - Existence and Properties of Nash Equilibria.</p> <p><b>UNIT II Extensive-Form Games</b>            Definition - Strategies and Equilibria in Extensive Form Games - Backward Induction and Subgame Perfection and its Critiques.</p> <p><b>UNIT III Repeated Games</b>            Infinitely/finitely repeated games - Pareto Perfection and Renegotiation - Proofness in Repeated Games - Repeated Games with incomplete Public Information - Trigger strategies - Folk Theorem with Imperfect Public Information.</p> <p><b>UNIT IV Static Games with incomplete information</b>            Mixed and Behavioral strategies - Bayesian Nash equilibrium - Applications in auctions - Different auction formats - Revenue and efficiency properties of different auctions - Bayesian Games and Mechanism Design Principle - Single Agent - Several Agents - Further topics in Mechanism Design.</p> <p><b>Unit V Dynamic Games with incomplete information</b>            Introduction - Perfect Bayesian Equilibrium in Multi-stage games - Extensive-Form and Strategic-Form Refinements - Reputation Effects - Sequential Bargaining under Incomplete Information.</p>			



**COURSE OBJECTIVES**

1. To explain and predict how individuals behave in a specific strategic situation, and therefore help improve decision making
2. To explain in depth the standard equilibrium concepts in Game Theory
3. To illustrate the concepts, real-world examples and case studies
4. To design Repeated Games with public information
5. To design static and Dynamic games with incomplete information

**MAPPING OF COs with Pos**

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Identify strategic situations and represent them as games	1,3,5,9
2. Solve simple games using various techniques	1,2,4,6,11
3. Recommend and prescribe which strategies to implement	2,8,11
4. Develop Static and Dynamic Games	1,3,5,6,9,10,11
5. Develop Repeated Games	1, 3,5,6,8,11,12

**COURSE PLAN – PART**

**COURSE OVERVIEW**

This course focuses on the key concepts in game theory and attempts to outline the informal basic ideas that are often hidden behind mathematical definitions. The course will provide the basics representing games and strategies, the extensive form, Bayesian games (modelling things like auctions), repeated games, static game and dynamic game.

**COURSE TEACHING AND LEARNING ACTIVITIES** (Add more rows)

Sl. No.	Week/Contact Hours	Topic	Mode of Delivery
1	18.08.2021 1 hour	UNIT I: Games and solutions - Game theory and mechanism design	Online (MS Teams)
2	23.08.2021 1 hour	Examples from networks – Strategic form games	Online (MS Teams)
3	25.08.2021 1 hour	Pure Strategy problems	Online (MS Teams)



4	27.08.2021 1 hour	Matrix and continuous games	Online (MS Teams)
5	30.08.2021 1 hour	Iterated strict dominance – Rationalizability	Online (MS Teams)
6	1.09.2021 1 hour	Mixed and correlated equilibrium	Online (MS Teams)
7	3.09.2021 1 hour	Super modular games - Potential/congestion games	Online (MS Teams)
8	4.09.2021 1 hour	UNIT II: Extensive form games Strategies and Equilibria in Extensive Form Games	Online (MS Teams)
9	6.09.2021 to 8.9.2021	<b>Cycle Test 1</b>	
	1 hour		
10	13.9.2021 1 hour	Backward Induction	Online (MS Teams)
11	15.09.2021 1 hour	Subgame Perfection and its Critiques	Online (MS Teams)
12	17.09.2021 1 hour	UNIT III: Infinitely repeated games	Online (MS Teams)
13	20.09.2021 1 hour	finitely repeated games	Online (MS Teams)
14	22.09.2021 1 hour	Pareto Perfection	Online (MS Teams)
15	24.09.2021 1 hour	Renegotiation	Online (MS Teams)
16	27.09.2021 1 hour	Proofness in Repeated Games	Online (MS Teams)



17	29.09.2021 1 hour	Repeated Games with incomplete Public Information	Online (MS Teams)
18	1.10.2021 1 hour	Trigger strategies	Online (MS Teams)
19	4.10.2021 1 hour	Fork Theorem with Imperfect Public Information	Online (MS Teams)
20	6.10.2021 to 8.10.2021 1 hour	<b>Cycle Test 2</b>	
21	11.10.2021 to 1 hour	UNIT IV: Static Games Introduction	Online (MS Teams)
22	13.10.2021 1 hour	Static Games with incomplete information	Online (MS Teams)
23	18.10.2021 1 hour	Mixed Strategies and Behavioral strategies	Online (MS Teams)
24	20.10.2021 1 hour	Bayesian Nash equilibrium	Online (MS Teams)
25	22.10.2021 1 hour	Applications in auctions	Online (MS Teams)
26	25.10.2021 1 hour	Different auction formats	Online (MS Teams)
27	27.10.2021 1 hour	Revenue and efficiency properties of different auctions	Online (MS Teams)
28	29.10.2021 1 hour	Bayesian Games	Online (MS Teams)
29	1.11.2021 1 hour	Mechanism Design Principle	Online (MS Teams)



30	3.11.2021 1 hour	Single Agent and Several Agents	Online (MS Teams)
31	5.11.2021 1 hour	Further topics in Mechanism Design	Online (MS Teams)
32	8.11.2021 1 hour	UNIT V: Dynamic Games with incomplete information Introduction	Online (MS Teams)
33	10.11.2021 1 hour	Perfect Bayesian Equilibrium in Multi-stage games	Online (MS Teams)
34	12.11.2021, 15.11.2021 to 16.11.2021 1 hour	<b>Cycle Test 3</b>	
35	17.11.2021 1 hour	Extensive-Form and Strategic-Form Refinements	Online (MS Teams)
36	22.11.2021 1 hour	Reputation Effects	Online (MS Teams)
37	24.11.2021 1 hour	Sequential Bargaining under Incomplete Information	Online (MS Teams)



<b>COURSE ASSESSMENT METHODS</b> (shall range from 4 to 6)				
Sl. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	As per academic schedule	1 hour	15
2	Cycle Test 2		1 hour	15
3	Cycle Test 3		1 hour	15
4	Assignment 1	Sep 4 <sup>th</sup> week	-	10
5	Assignment 2	Nov 1 <sup>st</sup> week	-	15
CPA	Compensation Assessment*	As per academic schedule	1 hour	15
6	Final Assessment*		2 hours	30
<b>*Mandatory; refer to guidelines on page 4</b>				
<b>COURSE EXIT SURVEY</b> (mention the ways in which the feedback about the course shall be assessed)				
<ol style="list-style-type: none"><li>1. Students' feedback through PAC meetings</li><li>2. Feedbacks are collected before final examination through MIS or any other standard format followed by the institute</li><li>3. Students, through their Class Representatives, may give their feedback at any time to the course faculty which will be duly addressed.</li></ol>				
<b>COURSE POLICY</b> (including compensation assessment to be specified)				
<b><u>MODE OF CORRESPONDENCE</u></b> (email/ phone etc)				
Email, in-person – after 4.00 pm.				
<b><u>COMPENSATION ASSESSMENT POLICY</u></b>				
<ol style="list-style-type: none"><li>1. One compensation assessment will be given after completion of Cycle Test 1 and 2 for the students those who are absent for any assessment due to genuine reason.</li><li>2. Compensatory assessments would cover the syllabus of Cycle tests 1 &amp; 2</li><li>3. The prior permission and required documents must be submitted for absence signed by HoD/CSE.</li></ol>				
<b><u>ATTENDANCE POLICY</u></b> (A uniform attendance policy as specified below shall be followed)				
<input type="checkbox"/> At least 75% attendance in each course is mandatory.				



- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

**ACADEMIC DISHONESTY & PLAGIARISM**

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

**ADDITIONAL INFORMATION, IF ANY**

**TEXT BOOK**

1. Fudenberg, Drew, Jean Tirole, “Game Theory”, Cambridge, MA: MIT Press, 1991.

**REFERENCE BOOKS**

1. Nisan, Noam, Tim Roughgarden, Eva Tardos, Vijay V. Vazirani, “Algorithmic Game Theory”, Cambridge, UK: Cambridge University Press, 2007.
2. Fudenberg, Drew, David Levine, “Theory of Learning in Games”, Cambridge, MA: MIT Press, 1998.

1. The Course Coordinator is available for consultation during the time intimated to the students then and there.
2. Relative grading adhering to the instructions from the office of the Dean (Academic) will be adopted for the course.

**FOR APPROVAL**

Course Faculty  CC-Chairperson  HOD 