

**DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING  
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE PLAN</b>			
<b>Name of the Programme and Specialization</b>	<b>B. Tech in Instrumentation and Control Engineering</b>		
<b>Course Title</b>	<b>NETWORK CONTROL SYSTEM (VIII th SEM)</b>		
<b>Course Code</b>	<b>ICPE 31</b>	<b>Course credits</b>	<b>3</b>
<b>Pre-requisites Course Code</b>	<b>NIL</b>		
<b>Session</b>	<b>January 2023</b>	<b>Section</b>	<b>NA</b>
<b>Name of Faculty</b>	<b>Dr. N. SIVAKUMARAN</b>	<b>Department</b>	<b>ICE</b>
<b>E-mail</b>	<b><a href="mailto:nsk@nitt.edu">nsk@nitt.edu</a></b>	<b>Mobile No.</b>	<b>9443745705</b>
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Program Elective course</b>	<input type="checkbox"/> <b>Core course</b>	
<b>Syllabus (As approved in BoS) Available on Department website</b>			
Introduction to multi-agent systems, Information exchange via local interactions, Basics of graph theory			
Reaching agreement in undirected and directed networks, Agreement via Lyapunov functions, Agreement over random networks			
Formation control, Shape based control, Dynamic formation selection, Assigning roles, Cooperative robotics, Wireless sensor networks			
Graph theoretic controllability, Network formation, Optimizing the weighted agreement, Planning over proximity graphs, Higher order networks			
Introduction to social networks, opinion dynamics, epidemics, games etc.			
<b>COURSE OBJECTIVES</b>			
The subject aims			
1. To expose the students to the emerging field of multi-agent and network control systems			
2. To expand the scope of traditional control systems to include large-scale interconnected systems			
3. To demonstrate consensus and leader-follower paradigms in a distributed environment			
4. To introduce different applications that fall in the gamut of network control systems.			
<b>COURSE OUTCOME (CO)</b>			
<b>Course Outcome (CO)</b>	<b>Aligned Program Outcomes (PO)</b>		
On completion of this course, the students will be able to,			
1. Design control system in the presence of quantization, network delay or packet loss.	1,2,3		
2. Understand distributed estimation and control suited for network control system.	1,2,3		
3. Develop simple application suited for network control systems.	1,2,3		
4. Technically understand larger-scale techno-socio-economic networks and models prevalent in	1,2,3		

28-29	10 <sup>th</sup> week	Introduction to graph theory	PPT
	End of 10 <sup>th</sup> week	<i>Assessment-2:</i> Written exam (20% Weightage)	<b>Offline</b>
30-35	11 <sup>th</sup> - 12 <sup>th</sup> week	Simulation of network control system	PPT
35 – 41	13 <sup>th</sup> – 14 <sup>th</sup> week	Application of network control system	PPT
	Last week	<i>Final Assessment:</i> Written exam (30% Weightage)	<b>Offline</b>

<b>COURSE ASSESSMENT METHODS</b>				
<b>Sl.No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>Percentage</b>
1	Assessment 1 - Presentation and Discussions based on case studies	From 4th week	1 hour	20%
2	Assessment 2 - Written Exam	End of 10th Week	1 hour	20%
3	CPA - Compensation Assessment*	End of 14th Week	1 hour	20%
4	Quiz/ Seminar			30%
5	Final Assessment* (End Semester Exam)	End of the semester	3 hours	30%
<b>*mandatory; refer to guidelines on page 4 and page 5</b>				

## ACADEMIC HONESTY

- Mid-term and End-term assessments in this course must be strictly individual work.

## ACADEMIC DISHONESTY

For purposes of this class, academic dishonesty is defined as:

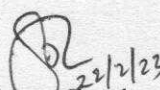
- Any attempt to pass off work on a test that didn't come straight out of your own head.
- Any collaboration on artifacts in which the collaborating parties do not clearly explain exactly who did what, at turn-in time.
- Any activity that has the effect of significantly impairing the ability of another student to learn. Examples here might include destroying the work of others, interfering with their access to resources, or deliberately providing them with misleading information.
- Please make a careful note of: ACADEMIC DISHONESTY & PLAGIARISM (cf. M.21.0 & M.22.0, page 13, <https://www.nitt.edu/home/academics/rules/PG-Regulations-2019.pdf>)
  - 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.

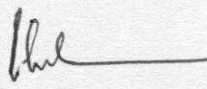
## ADDITIONAL INFORMATION

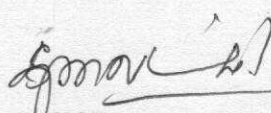
The students are advised to clarify their doubts and discuss during the lecture hour. Other than, for out-of-class discussion, they can email their Queries to the Course faculty directly at [nsk@nitt.edu](mailto:nsk@nitt.edu)

Any changes in the proposed layout of the semester, due to unavoidable circumstances, shall be intimated immediately to the students and to the Chairperson, PAC.

## FOR APPROVAL

  
Course Faculty:  
(Dr. N. Sivakumaran)

  
CC-Chairperson:  
(Dr. Sri Ram Shankar R)

  
HOD:  
(Dr. K. Dhanalakshmi)