

# Emerging Trends in Advance Control System Applications in Intelligent Transport Systems

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## Overview of the course:

The design, analysis, and evaluation of Intelligent Transportation Systems (ITS) requires good knowledge of traffic flow modelling and control techniques as well as of powerful methodologies from the areas of optimization, control, networks and dynamic systems. The purpose of the intensive 5-day course is to cover the basic theory, methods and tools necessary for efficient design and evaluation of ITS on road and freeway networks. After a basic introduction to dynamic systems and control, the course continues with traffic flow modelling and validation issues, the modelling of traffic networks, dynamic traffic assignment and simulation tools. Measurement devices and estimation problems in traffic networks, including automatic incident detection and OD estimation, are presented and discussed. The state-of-the-art techniques in freeway traffic control, road traffic control and integrated traffic control, employing ramp metering, signal control, variable speed limits and route guidance, along with several field implemented case studies are presented. Future prospects and challenges related to emerging vehicle automation and communication systems are discussed. Brief accounts of some optimization, control and estimation techniques are provided. Some 50 exercises are used for consolidation of the provided knowledge. Extensive written materials, including all transparency copies, are handed out.

<b>Modules</b>	<b>This course consists of one module only. 04 December 2017 to 08 December 2017.</b>
<b>You Should Attend If You are</b>	<ul style="list-style-type: none"> <li>▪ Students of B.Tech, MTech, Ph.D. research scholars and faculty members of academic institutions and technical institutions.</li> <li>▪ Executives, engineers and researchers from manufacturing, service and government organizations, including R&amp;D laboratories.</li> </ul>
<b>Registration Fees</b>	<p>The participation fees for attending the course is as follows:  <b>Overseas Participants: US\$ 200</b>  <b>Industry/ Research Organizations: Rs. 5000</b>  <b>Participants from Academic Institutions: Rs. 2000</b>  <b>Research Scholars/Students/Alumni: Rs. 1000 (Rs. 500 for SC/ST students)</b></p> <p>After registration on GIAN portal <a href="http://www.gian.iitkgp.ac.in/GREGN/index">http://www.gian.iitkgp.ac.in/GREGN/index</a>, the candidates are advised to submit the prescribed fee in the form of DD in favor of <b>“Registrar, DTU”</b> payable at Delhi along with printout of online submitted application form to <b>Ashish Rajeshwar Kulkarni, Course Coordinator (GIAN), Department of Electrical Engineering, Delhi Technological University, Bawana Road, Delhi-110042</b> on or before 20.11.2017. The shortlisted participants will be informed through e-mail.</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments and laboratory equipment usage charges. The course fee does not include boarding and lodging.</p>

## Teaching Faculty



**Professor Markos Papageorgiou's** general area of scientific interest is in modelling, optimisation and automatic control, and their applications to traffic and transportation systems, water networks, and further areas. Over the past 35 years, Prof. Papageorgiou has been involved with the development and validation of traffic flow models, and with the design, testing, and implementation of traffic control strategies for a variety of traffic control problems. He has taught regular and intensive courses on Traffic Flow Modelling and Control at renowned universities and institutions in many countries. He has been actively involved in national and international R&D projects

and programs in different capacities and he has served as a consultant to industrial, 4 research, and governmental institutions in various countries. He is the author of "Applications of Automatic Control Concepts to Traffic Flow Modelling and Control" (Springer, 1983) and "Optimierung" (Oldenbourg, 1991; 1996; Springer, 2012;2015), the Editor of "Concise Encyclopedia of Traffic and Transportation Systems" (Pergamon, 1991), and the author of numerous technical papers. He was the Editor-in-Chief of Transportation Research - Part C (2005-2012); Prof. Papageorgiou is a Fellow of the IEEE and a Fellow of IFAC. He was a recipient of the IEEE Intelligent Transportation Systems Society Outstanding Research Award (2007) and of the IEEE Control Systems Society Transition to Practice Award (2010). He was presented the title of Visiting Professor by the University of Belgrade, Serbia (2010). The Dynamic Systems and Simulation Laboratory he has been heading since 1994, received the IEEE Intelligent Transportation Systems Society ITS Institutional Lead Award (2011). Prof Papageorgiou received an ERC Advanced Investigator Grant for the project TRAMAN21 (Traffic Management for the 21st Century) (2013-2017). He is the recipient of the Highest Cited Author Award by the Committee of Traffic Flow Theory and Characteristics of the TRB (2014).

## Host Faculty



**Dr. Narendra Kumar** is Professor in Electrical Engineering Department at D.T.U, Delhi, India. Prof. Narendra Kumar received his B.E. (Electrical Engg.) degree from University of Roorkee, now IIT Roorkee in 1985, M. Tech from Punjab Engineering College, Chandigarh in 1987 and Ph.D. from Delhi College of Engineering, Delhi University in 2003. He has published more than 45 research papers and guided more than 60 M. Tech students. Currently he's guiding 6 Ph.D.'s. His areas

of research include Control and Instrumentation and Power Electronics applications in control system. He's also International contributor for three International titles of Pearson International.



**Ashish Rajeshwar Kulkarni** is Assistant Professor in Electrical Engineering Department at DTU, Delhi, India. He received B.E. (Electrical, Electronics & Power) degree in 1997 from Government Engineering College, Aurangabad and M.E. (Control Systems) in 2002 from Collegel of Engineering, Pune under Pune University. He's currently pursuing Ph.D. in area of Control System applications in Intelligent Transport Systems. His areas of research are Adaptive control systems, Intelligent Transport Systems, Microcontroller & Embedded system

applications in automation, Power Quality. He's also International contributor for three International titles of Pearson International

Course Coordinator's

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Patron

**Prof. Yogesh Singh**

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**For Registration:**

<http://www.gian.iitkgp.ac.in/GREGN/index>

# Emerging Trends in Advance Control System Applications in Intelligent Transport Systems

## Tentative Course Schedule

**4<sup>th</sup> December 2017**

**Registration; 9:00 AM to 10:00 AM**

**Inauguration: 10:00 AM to 11:00 AM**

<b>Date</b>	<b>Day</b>	<b>Time</b>	<b>Type of Class</b>	<b>Topic</b>
4 <sup>th</sup> December, 2017	Monday	11.30AM – 1.30 PM	Lecture-1	Introduction to regulation problem, controllers and automatic control systems
		2.30 PM-3.30 PM 4.00 PM-5.00 PM	Lecture-2	Traffic flow modelling-macroscopic and microscopic modeling
5 <sup>th</sup> December, 2017	Tuesday	10.00AM – 11.00 AM	Lecture-3	Modeling of traffic flow network
		11.15AM-12.15PM	Lecture-4	Modeling of traffic flow network
		1:45 PM – 2.45 PM	Lecture-5	Measurement and estimation part-1
		3.00 PM– 5.00 PM	Tutorial-1	Tutorial
6 <sup>th</sup> December, 2017	Wednesday	10.00AM – 11.00 AM	Lecture-5	Measurement and estimation part-ii
		11.15AM-1.15PM	Lecture-6	Freeway traffic control
		2.00PM – 5.00 PM	Tutorial-2	Tutorial
7 <sup>th</sup> December, 2017	Thursday	10.00AM – 11.00 AM	Lecture-7	Road traffic control part-i
		11.15AM-12.15PM	Lecture-8	Road traffic control part-ii advanced traffic control algorithms
		2.00PM – 5.00 PM	Tutorial-3	Its case studies.
8 <sup>th</sup> December, 2017	Friday	10.00AM – 11.00 AM 11.15 AM-12.15 PM	Lecture-9	Its emerging challenges and technologies
		12.30 PM-1.30 PM	EXAMINATION	
		3.00PM – 5.00 PM	DISCUSSIONS AND VALEDICTORY FUNCTION	