NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – CE611 TRAFFIC FLOW THEORY

BRANCH: CIVIL ENGINEERING

SPECIALIZATION: Transportation Engineering and Management

SEMESTER: II

COURSE OUTLINE TEMPLATE			
Course Title	**TRAFFIC FLOW THEORY**		
Course Code	**CE611**	**No. of Credits**	**3**
Department	Civil	**Faculty**	**Dr. S. Moses Santhakumar**
Pre-requisites Course Code	None		
E-mail	moses@nitt.edu	**Telephone No.**	**9842450011 (M) 3155 (O)**
Course Type	**Elective course**		

COURSE OVERVIEW

To understand the principles of ITS, and learn macroscopic and microscopic models of traffic flow theory.

COURSE OBJECTIVES

1. To be introduced to traffic flow theory
2. To study macroscopic and microscopic modeling
3. To learn the fundamentals of ITS

COURSE OUTCOMES (CO)

Course Outcomes	**Aligned Programme Outcomes (PO)**
1. Ability to analyze the traffic stream parameters	a b d
2. Skill to apply the Microscopic and Macroscopic models	a b c e g i
3. Capability to interpret the significance of ITS under Indian conditions	a b c e g i

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1.	Week 1	• Syllabus and course content • Traffic stream parameters • Flow, speed and density	• Chalk and Board
2.	Week 2	• Fundamental diagram of volume-speed-density surface • Variation of the stream parameters • Discrete and continuous probability distributions	• Chalk and Board • Tutorials
3.	Week 3	• Merging manoeuvres • Critical gaps and lags • Probability distributions of gaps and lags	• Chalk and Board
4.	Week 4	• Macroscopic models • Heat flow analogy • Fluid flow analogy	• Chalk and Board
5.	Week 5	• Shock waves • Examples using u-k diagram • Bottleneck analysis	• Chalk and Board • Tutorials
6.	Week 6	• Microscopic models • Application of queuing theory • Queue definitions	• Chalk and Board
7.	Week 7	• Cycle Test I	
8.	Week 8	• Regular, random and Erlang arrival patterns • Service time distributions • Queue discipline and special cases	• Chalk and Board
9.	Week 9	• Waiting time in single channel queues • Practical applications - Problems • Extension to multiple channels	• Chalk and Board • Tutorials

10.	Week 10	• Linear car following models • Stimulus – Response equation • Determination of car following variables	• Chalk and Board
11.	Week 11	• Tracking of vehicle pair • Time slice method • Practical applications - Problems	• Chalk and Board • Tutorials
12.	Week 12	• Traffic stability – local and asymptotic • Non-linear car following models • Acceleration noise	• Chalk and Board
13.	Week 13	• Cycle Test II	
14.	Week 14	• Intelligent Transportation Systems • Geographical Information System principles • Global Positioning System principles	• PPT
15.	Week 15	• Area Traffic Control • Automatic Toll Collection • Smart Cards	• PPT
16.	Week 16	• Intelligent vehicle • Sensor technologies • Collision Detection System	• PPT
17.	Week 17	• Applications in developed countries • Intelligent Vehicle – Highway Systems • Applications under Indian countries	• PPT

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Cycle Test 1	Week 7	1 hour	20
2.	Cycle Test 2	Week 13	1 hour	20
3.	Assignment 1	Macroscopic models		5
4.	Assignment 2	Intelligent Transportation Systems		5
5.	End Semester	Week 18	3 hours	50

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Drew, D.R., *Traffic Flow Theory and Control*, McGraw Hill., 1978.
2. TRB, *Traffic Flow Theory* - A Monograph, SR165, 1975.
3. Burrough P.A. and Rachel A. McDonell, *Principles of Geographical Information Systems*, Oxford Publication, 2004.
4. Sussman, J. M., *Perspective on ITS*, Artech House Publishers, 2005.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

It is proposed to take feedback from the students, at the end of the semester to evaluate the execution of the course.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

Attendance

- The closing date of attendance for the subject is Week 17.
- 100% attendance is desirable for every student, with minimum attendance being 75%.

Grading

- Grading will be done with normalized score.

ADDITIONAL COURSE INFORMATION

- The Course Coordinator is available for consultation during office hours.
- Queries, if any, can also be emailed to the Course Coordinator directly at moses@nitt.edu.

FOR SENATE'S CONSIDERATION

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____