

## **CIVIL 361 - TRANSPORTATION ENGINEERING 2**

**(10 Points, SC 2009)**

**COURSE CO-ORDINATOR**      Dr Prakash Ranjitkar (Room 1.1214, ext 83513)

**OTHER LECTURERS:**            Prof. Avi Ceder (Room 1.606, ext. 85858)  
   A/Prof. Roger Dunn (Room 1.1106, ext. 87714)

**TIMES:**                            Tuesday 12-1, Wednesday 10-11, Friday 12-1(Room:  
   Eng 1.401)  
   Refer to Schedule issued.

### **COURSE OBJECTIVES**

This is an introductory paper in traffic engineering and transportation planning - it follows the first semester paper in highway engineering (Transportation Engineering 1, CIVIL360). It is also a terminal course in the transportation area for those not taking either of the two Year 4 electives, Traffic Systems Design (CIVIL460) and / or Highway and Transportation Engineering (CIVIL461). The paper introduces the main planning and design techniques, criteria and basic theories used in practice. These notes are to provide a background of the main principles and methodologies used in traffic engineering, within the time constraints given - as wide a range as possible has been chosen. Hence, some topics are covered in more detail than others. The priority of topics has been based on their relative importance within traffic engineering and on the expected usefulness of the topic in professional practice for those undertaking and completing their BE (Civil) at The University of Auckland.

### **COURSE CONTENTS**

The number of hours refers to the expected scheduled allocation of hours which is supplied separately.

- ***Traffic Measurements and Studies - 3 hours***  
Traffic flow measurements include measurement of headways, speed, density, occupancy and flow; traffic studies include volume studies, speed studies, travel time and delay studies.
- ***Traffic Signals Operations and Design - 6 hours***  
Intersection capacity, advantages/disadvantages of signals, basic operation of vehicle actuated controllers, critical flow ratio method of design and analysis, split phases, shared lanes and amalgamation, techniques to accommodate high left and right turns, estimation of operational characteristics (intro.).
- ***Highway Capacity - 4 hours***  
Highway Capacity Manual methodology for multi-lane highways, levels of service concept, ideal conditions, estimation of flows at given levels of service.
- ***Traffic Flow Models - 4 hours***  
Vehicles trajectories on time-space diagram, from micro- to macroscopic traffic flow models, Speed-flow-density relationships, capacity of un-signalized intersection.
- ***Roads, Streets, plus Parking - 3 hours***  
Types and classification of roads and streets; a hierarchical network concept and environmental areas, separate functions concept, parking design (one level).

- ***Driving Task and Driver Behaviour - 2 hours***  
Driver's information processing, driver's information channels and modelling, car-following behaviour and models.
- ***Transportation Planning - 4 hours***  
Demand analysis, networks of roadways, maximum-flow procedure, shortest-path procedure.
- ***Public-Transport Operations Planning - 4 hours***  
Operational-planning process, frequency and timetable determination, design of public-transport network of routes, priority treatment.

## **FORMAT**

Refer to schedule supplied separately - this results in about 2-3 lectures per week, with the balance being allocated to tutorials, and revision. Lectures will cover the basic information including the issue of notes. Tutorials will be used principally for problem solving and assignment exercises but also for revision and the test. Examples of professional practice will be shown at relevant stages.

## **ASSESSMENT**

Assignments,	15%
Test (1 hour),	25%
Final Exam (2 hours),	60%

## **TEXT BOOK/REFERENCES**

There are no prescribed textbook for this course. The following are recommended for background reading and reference and would form a useful personal library - copies are available in the School of Engineering Library.

- Ogden, K.W. and Taylor, S.Y. (2003) Traffic Engineering and Management. Monash University (1996 and reprinted 1999) (Editors).
- Austrroads (1988 and onwards to 2004) Guide to Traffic Engineering Practice. Parts 1 to 15 (Austrroads, Sydney, Australia).
- Robertson, H.D., Hummer, J.E. and Nelson, D.C. (1994) Manual of Transportation Engineering Studies, Prentice Hall.
- Papacostas, C.S. and Prevedouros, P.D. (1990) Transportation Engineering and Planning, Prentice Hall.
- Highway Capacity Manual (2000) Transportation Research Board, National Research Council, USA.
- May, A.D. (1990) Traffic Flow Fundamental, Prentice Hall.

## **SCHOLARSHIPS**

### **HYDER Consulting (NZ) Ltd Prize**

One scholarship will be awarded with a value of NZ\$ 1000 to the top student in this course.

### **TRAFFIC DESIGN GROUP LTD SCHOLARSHIP**

One Scholarship will be awarded to annually and to a value of \$7500. Application Forms and the selection criteria are available from the University Scholarships Office. Traffic Design Group Ltd is New Zealand's leading specialist traffic engineering and transport planning consultancy, with offices in Auckland, Tauranga, Wellington, Christchurch and Hawke's Bay.