Background and Aims

This unit develops students’ understanding of the network models used in transport planning. The emphasis is on strategic network models which are used for longer term network planning as opposed to operational considerations. The traditional four step models of trip generation, mode choice and traffic assignment are considered in detail. The capabilities of commercial network modelling packages are reviewed.

After completing this unit participants will:

- understand the component models and the modelling framework used in transport network modelling
- appreciate the strengths and weaknesses of various transport models
- be able to calibrate and apply transport network models
- be aware of the role of analytic modelling in transport planning

Details of the structure of the unit are provided over the page.

Enrolment Options

Enrol in either the Master of Transport or Master of Traffic or as a single unit. Exit options are also available for the Graduate Certificate in Transport and Traffic or the Graduate Diploma in Transport and Traffic.

Off-Campus Study Mode

The program is taught by off-campus learning which means you can balance your work and study while attaining your qualification with Monash University. There are no classes to attend so you can study where and when you like. Students from all over the world study in the postgraduate program, thanks to its flexible off-campus learning mode. Students and graduates can be found throughout Australia, New Zealand, the Middle East, Europe, North America and Africa.

A combination of printed study material and electronic communications are used in the delivery of the program. Academic assistance can be obtained by email or telephone. Discussion groups and other forms of on-line communication are also available for communicating with staff and other students.

Unit Co-ordinator

Majid Sarvi graduated as a Civil Engineer and received his Masters and PhD in Traffic and Transportation Engineering. Prior to joining Monash University in 2003, Majid worked for a few years at Tokyo University where his research focussed on Intelligent Transport Systems.

Enrolment or General Course Enquiries:

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The unit is structured around 10 topics most of which are associated with one week of study.

<table>
<thead>
<tr>
<th>Topic</th>
<th>After completing this topic, participants will:</th>
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| 1. A Framework for Model Development                                | • understand the steps involved in developing a mathematical model,  
• understand a basic model of the transportation system, and  
• appreciate the foundations of a model of transport systems behaviour.                                                                                                                                                                                                                                                                                     |
| 2. An Introduction to Four Step Transportation Planning Models     | • familiar with the structure of the four step transportation planning model system,  
• able to calibrate and apply trip generation models using regression and category analysis procedures,  
• able to predict trip distribution using simple growth factor models and the gravity model,  
• able to predict mode choice using a logit choice model,  
• able to predict traffic assignment using all-or-nothing and incremental assignment, and  
• appreciate priority areas for improved practice with the four step model system.                                                                                                                                                                                                                                                                  |
| 3. Advanced Trip Generation Modelling                              | • appreciate the methodologies used in advanced trip generation models,  
• understand the impacts of data aggregation on model calibration and prediction, and  
• be aware of the advantages and disadvantages of using more detailed socio-economic variables in trip generation models.                                                                                                                                                                                                                                                                  |
| 4. Trip Distribution Modelling                                     | • be able to apply growth factor models,  
• be able to calibrate single constrained gravity models using a general deterrence function,  
• understand how a generalised cost term can be incorporated into the deterrence function of a trip distribution model,  
• understand where ‘K’ factors are used in trip distribution models and appreciate their advantages and disadvantages, and  
• be aware of developments in destination choice modelling.                                                                                                                                                                                                                                                                              |
| 5. Disaggregate Mode Choice Modelling                              | • understand the behavioural theory which provides the theoretical foundation for disaggregate mode choice models,  
• be familiar with the binary and multinomial logit model,  
• appreciate the implications that the ‘Independence from Irrelevant Alternatives’ property of the logit model has for its responsiveness to changes in the transportation system,  
• understand the different classes of variables that can be incorporated into a mode choice model, and  
• understand how these models are calibrated and applied.                                                                                                                                                                                                                                                                              |
| 6. Traffic Assignment                                               | • understand the various techniques used to assign traffic to a network,  
• understand how shortest paths through networks are determined, and  
• appreciate how tolls can be accounted for in traffic assignment.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7. Transport Modelling                                             | • understand the importance of land use / transport interaction and the purpose of land use models,  
• be aware of the basic drivers in population and employment change,  
• appreciate the different types of land use models,  
• understand the concept of accessibility,  
• be aware of the limitations of the various types of land use models,  
• understand the shortcomings of heuristic approaches to achieving equilibrium in the transport model system, and  
• be aware of the availability of solution approaches to achieve equilibrium in the transport model system.                                                                                                                                                                                                                                                                                           |
| 8. Introduction to Simulation Modelling                            | • when it is appropriate to use simulation in traffic/transportation analyses,  
• why the use of simulation is growing,  
• the strengths and potential problems with using simulation,  
• understand where 'K' factors are used in trip distribution models and appreciate their advantages and disadvantages, and  
• be aware of developments in destination choice modelling.                                                                                                                                                                                                                                                                                                                                 |
9. Simulation Modelling – Theory to Practice

- how to model the individual behaviour of vehicles using simulation, and
- how to use simulation to model more complex scenarios (e.g., queues, car-following, gap-acceptance) by considering the interaction between vehicles and the system itself.

10. Contemporary Issues in Transport Modelling

- have an awareness of current efforts to improve the theory and practice of transport modelling,
- understand the desirability of integrating GIS and transport modelling, and
- appreciate the capabilities and features of some of the commercially available software packages.

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